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CATALOGUE
OF
WELWITSCH'S AFRICAN PLANTS.
VOL. II.—PART II.

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CATALOGUE

OF THE

AFRICAN PLANTS

COLLECTED BY

DR. FRIEDRICH WELWITSCH
IN 1853-61.

VOLUME II. PART II.

CRYPTOGAMIA.

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VASCULAR CRYPTOGAMS.

BY WILLIAM CARRUTHERS, F.R.S.

SALVINIACEÆ.

AZOLLA Lam. Encycl. Meth., Bot. i. p. 343 (1783).

A. pinnata R. Br., Prodr. p. 167 (1810).

PUNGO ANDONGO.—Not infrequent in most rivers between Pungo Andongo and Cassange. The frond is whitish green, and then turns to rose-purple. It is found with *Nymphæa*, *Ceratophyllum* and *Pistia*. March 1857. No. **38**.

LIBONGO.—Very abundant, both on the earth and in the water, in the shallow lake at Banza de Libongo, near the left bank of the Lifune with *Hydrocotyle*, *Juncaceæ*, etc. Sept. 1858. No. **37**.

MARSILEACEÆ.

MARSILEA Linn. Gen. Pl. p. 326 (1737).

1. **M. cornuta** A. Br. in Monatsb. K. Akad. Wissensch. Berlin 1870, p. 728.

M. diffusa var. *cornuta* A. Br. in Kuhn, Fil. Afr. p. 199 (1868). *M. diffusa* var. Baker, Fern Allies p. 141 (1887).

MOSSAMEDES.—Common in shallow pools near the banks of the Bero, near Capondo and Cavalheiros. At the end of June 1859. No. **173**. Frequent, in association with *Pistia* in lakes near the mouth of the river Giraûl or Maiombo. Without fruit, 18 and 19 July 1859. No. **174**.

2. **M. rotundata** A. Br. in Kuhn, Fil. Afr. p. 200 (1868).

GOLUNGO ALTO.—Somewhat rare in the rivulet Muchau or Mongola near Quilombo, in wooded places ; 17 Sept. 1854. No. **40**.

PUNGO ANDONGO.—On the margins of marshes between Lombe and Quibinda. Without fruit ; March 1857. No. **39**.

HUILLA.—In pools near the river Mumpulla in association with *Ottelia*. In fr. June 1860. No. **171**. In wet ground between the Serra de Xella and Mumpulla along with *Trifolium*, *Juncus* and *Xyris*. Oct. 1859. No. **172**.

3. **M. muscoides** Lepr. ex A. Braun in Flora xxii. p. 300 (1839).

LOANDA.—In moist clayey mud, even spreading into neglected cultivated places, near Loanda, Bemposta, towards Camama ; in fr. 18 May 1859. No. **109**.

BENGUELLA.—In moist sandy muds, inundated in summer, on the shore between the city of Benguella and S. Ferrão dos Bimbos ; in fr. June 1859. No. **175**.

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SELAGINELLACEÆ.

1. **STACHYGYNANDRUM** Pal.-Beauv. Ætheog. p. 105 (1805).

Selaginellæ sp. Auct.

1. **S. Welwitschii.**

Selaginella Welwitschii Baker, Fern Allies, p. 39 (1887).

PUNGO ANDONGO.—On the sunny, gneissose rocks on the tops of the mountains of Pungo Andongo—Pedra Cazella ; Oct. 1856. No. **43.**

2. **S. depressum.**

Selaginella depressa A. Br. in Ind. Sem. H. Berol. 1859, p. 21.

Var. β, **minus** A. Br. in Kuhn, Fil. Afr. p. 211 (1868) (*minor*).

PUNGO ANDONGO.—Frequent in hollows and by the shaded sides of the rivulets (very rare on sun-exposed rocks) to the west of Pedra de Cazella ; Dec. 1856. No. **44.**

3. **S. versicolor.**

Selaginella versicolor Spring, Lycopodiac. ii. p. 124 (1848).

PUNGO ANDONGO.—In hollows on the mountains of Serra de Pedras de Guinga ; Jan. 1857. No. **41.**

GOLUNGO ALTO.—Somewhat rare at the cataracts of the lower rivulets of Capopa ; Jan. 1856. No. **42.**

4. **S. scandens** Pal.-Beauv. Ætheog. p. 106 (1805).

SIERRA LEONE.—On humid ground in shaded places on the mountains above Freetown ; Sept. 1853. No. **2.**

CONGO.—In the humid woods on the banks of the Zaire or Congo. No. **27.**

5. **S. tenerrimum.**

Selaginella tenerrima A. Br. in Kuhn, Fil. Afr. p. 193 (1868).

GOLUNGO ALTO.—Very rare on the mountains at 2400 ft. in Serra do Alto Queta, beside streams ; at the end of April 1856. No. **45.**

6. **S. subcordatum.**

Selaginella subcordata A. Br. in Kuhn, Fil. Afr. p. 193 (1868).

SIERRA LEONE.—Among mosses on shaded rocks on the mountains above Freetown ; Sept. 1853. No. **3.**

7. **S. rubricaule.**

Selaginella rubricaulis A. Br. in McNab, Trans. Bot. Soc. Edin. ix. p. 11 (1867).

Var. β. **angolense** A. Br. in Kuhn, Fil. Afr. p. 212 (1868) (*angolensis*).

PRINCE'S ISLAND.—In very shaded woods on Mount Pico de Papagaio, 2500 to 2300 ft. Sept. 1853. No. **11.**

GOLUNGO ALTO.—On the banks of rivulets in the woods of Alta Queta near Cazengue ; in fr. July 1856. No. **40.** Not infrequent among mosses in densely shaded places on the banks of Rio de Capopa ; in fr. Nov. 1855. No. **47.**

2. **SELAGINELLA** Pal.-Beauv. Ætheog. p. 101 (1805).

S. rupestris Spring, in Mart. Fl. Brasil. I. ii. p. 118 (1840).

Var. β. **incurva**, forma angolensis A. Br. in Kuhn, Fil. Afr. p. 213 (1868).

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HUILLA.—Frequent on rocks covered with brushwood not far from the cataracts of Ferrão da Sola in Sobato Lopollo, with *Gleichenia polypodioides*. Without fr. Dec. 1859; with fr. April 1860. No. **169**.

Var. γ. **recurva**, forma Welwitschiana A. Br. in Kuhn, Fil. Afr. p. 213 (1868).

PUNGO ANDONGO.—Frequent in rocky places, Pedras de Guinga; March 1857. No. **48**. Frequent on the highest rocks of the mountains of Pedras negras of Pungo; Feb. 1857. No. **49**.

3. **ISOETES** Linn. Sp. Pl. ed. v. p. 486 (1754).

1. **I. Welwitschii** A. Br. in. Kuhn, Fil. Afr. p. 196 (1868)

HUILLA.—In pastures with *Xyris*, *Ophioglossum*, and *Antrolepis*, or in turfy places with *Eriocaulon*, *Utricularia*, and *Drosera*, in the plain called Empalanca; in fr. April 1860. No. **166**.

2. **I. æquinoctialis** Welw. ex A. Br. in Kuhn, *l.c.*, p. 195 (1868).

PUNGO ANDONGO.—Not infrequent in sandy, moist, wooded pastures with *Drosera*, *Biophytum*, *Cyperaceæ*, etc., between Pungo Andongo and Sansamanda; 6 Feb. 1857. No. **50**.

LYCOPODIACEÆ.

LYCOPODIUM Linn. Gen. Pl. p. 313 (1737).

1. **L. cernuum** Linn. Sp. Pl. p. 1103 (1753).

PRINCE'S ISLAND.—In the primeval woods of Pico de Papagaio at 3000 ft.; Sept. 1853. No **10**.

FERNANDO PO.—No. **20**.

HUILLA.—By the margins of rivulets on the mountains of Lopollo, in company with species of *Melastomaceæ*, *Ericaceæ*, and *Cyatheæ*, at a height of 5000 ft.; in fr. May 1860. No, **170**.

2. **L. sarcocaulon** Br. & Welw. in Kuhn, Fil. Afr. p. 210 (1868).

HUILLA.—In spongy marshes with *Drosera* and *Utricularia*, Morro de Lopollo. Rarely fruiting. April 1860. Nos. **167, 168**.

FILICES.

1. **GLEICHENIA** J. E. Smith, in Mem. Acad. Turin. v. p. 419 (1793).

1. **G. polypodioides** J. E. Sm., *l.c.*, t. 4. f. 10; Hk. & Bak. Syn. Fil. p. 11.

HUILLA.—At the cataract of Ferrão da Sola, the long creeping stem among the plants of *Selaginella rupestris* Spring; April 1860. No. **162**

2. **G. Hermanni** R. Br. Prod. Flor. N. Holland. p. 164 (1810).

Polypodium dichotomum Thunb. Fl. Jap. p. 338, t. 37 (1784); *Mertensia dichotoma* Swartz Syn. Fil. p. 163 (1806); *Gleichenia dichotoma* Hk. Sp. Fil. i. p. 13 (1846).

A frutescent fern, with the stem at first 3 to 5 ft. high, and suberect, then dichotomously dividing, and climbing high and wide, 12 to 15 ft. and more high.

GOLUNGO ALTO.—Somewhat rare and sporadic on the slopes of Quilombo Quiacatubia towards the river Zenza; Feb. 1855. No. **72**.

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PRINCE'S ISLAND.—Not infrequent in the mountains called Pico de Papagaio; Sept. 1853. No. **19**.

2 **CYATHEA** J. E. Smith in Mem. Acad. Turin. v. p. 419 (1793).

1. **C. Welwitschii** Hk. Syn. Fil. p. 21 (1868).

ST. THOMAS.—In the natural woods of Monte Caffé; in fr. Dec. 1860. No. **66**.

2. **C. Angolensis** Welw. Apont. in Ann. Cons. Ultram. 1858, p. 538; Hk. & Bak. Syn. Fil. p. 22.

PUNGO ANDONGO.—Not infrequent on the humid high rocks of the præsidium near the brooks, as Funda Quilombo, Catete, etc., not seen beyond the limits of the præsidium. Growing with *Musa ventricosa*. In fr. November and December 1856. Fronds with fully mature fructification, Barrancos de Catete; May 1857. No. **83**.

HUILLA.—Very frequent near the banks of the streams in the higher regions of Morro de Lopollo. In fr. Jan. 1860. No. **186**.

3. **ALSOPHILA** R. Br. Prod. Flor. N. Holland. p. 158 (1810).

1. **A. æthiopica** Welw. in Hk. & Bak. Syn. Fil. p. 44 (1868).

GOLUNGO ALTO.—In shady places in the natural wood on the northern side of Alto Queta. In fr. at the beginning of June 1855. No. **116**. Somewhat rare in the woods of Quisucula, Bango. Fruiting August 1857. No. **116**. In the natural woods of Mata de Quisucula; July 1857. No. **128**.

4. **TRICHOMANES** Linn. Gen. Pl. Ed. ii. p. 504 (1742).

1. **T. pyxidiferum** Linn. Sp. Pl. p. 1098 (1753).

GOLUNGO ALTO.—Along with *Polypodium irioides*, on moss-covered trunks in the primitive forests, at Mata di Quisucula, near Bango Aquitamba. In fr. Aug. 1857. No. **73**.

2. **T. radicans** Sw. Flor. Ind. Occid. iii. p. 1736 (1806).

GOLUNGO ALTO.—On moist banks near the streams on the high shady places of Mata de Quisucula. Without fr. 28 April 1856. No. **74**.

3. **T. rigidum** Sw. Flor. Ind. Occid. iii. p. 1738 (1806).

GOLUNGO ALTO.—On the shady rocks of the mountains of Serra de Alto Queta, above Sange. Without fr. 27 May 1855; with fr. end of June 1855. No. **75**.

The imperfect fragment (No. 2042) in the British Museum is indeterminable. Dr. Welwitsch found it intermixed with *Selaginella rubricaulis* (No. 47) when he was working with his herbarium in London. The specimens were found near Capopa, Golungo Alto.

5. **DAVALLIA** J. E. Sm. in Mem. Acad. Turin. v. p. 414 (1793).

1. **D. nitidula** Kze. in Linnæa x. p. 545 (1836).

GOLUNGO ALTO.—Frequent on living trunks of trees, especially of palms (*Elæis* and *Raphia*) in the dense woods of Serra de Alto Queta. In fr. Jan. 1855. No. **146**. On trees in the damp woods near Sange; Dec. 1854. No. **146***b*.

2. **D. Vogelii** Hook. Sp. Fil. i. p. 168 (1846).

ST. THOMAS.—On the old stems of palms (*Elæis*), in the humid

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woods at about 1500 to 2000 ft. In fr. Dec. 1880. No. **56**. Baker (Syn. Fil.), and Mettenius in Kuhn, Fil. Afr. p. 158, have referred this species to *D. elegans* Sw. (*D. denticulata* Mett.). If the spurious venules so characteristic of *D. elegans* are of any value for determining species, this plant cannot be included in that species.

3. **D. flaccida** R. Br. Prod. Fl. N. Holl. p. 157 (1810).

D. polypodioides Sw. Adnot. p. 69 (1829). *D. Speluncæ* Baker Syn. Fil. p. 100 (1868).

ST. THOMAS.—In the margins of the woods near Monte Caffé, frequent up to 2560 ft., but seldom in fruit. A very beautiful fern 4-6 ft. and taller, with a stout stipes and hairy spreading pinnæ; Dec. 1860. No. **56**.

GOLUNGO ALTO.—On the banks of the river Delamboa, near Tange, 4 to 6 and even 8 ft. high; in good fr. Sept. 1856. No. **124***b*. In dense primitive woods at Sobato de Quilombo, near the rivulets, and not far from the *Adansonia* on which *Rhipsalis* was found. In fr. Jan. 1855. No. **126**.

Two young plants from this district are found in Welwitsch's Herb.; the one, No. **124**, was found in the primitive woods by the river Delamboa, near Sange, July 1856; and the other, No. **125**, appeared in his garden at Golungo, a seedling the spores of which were brought with plants from Sobato de Bumba. These both belong to this species.

PUNGO ANDONGO.—In shady places at Pedra de Cabondo; Dec. 1856. No. **127**.

4. **D. thecifera** H.B.K. Nov. Gen. Sp. Pl. i. p. 23 (1815).

Asplenium theciferum Mett. Ann. Sc. Nat. Ser. v. vol. ii. p. 227 (1843). *D. Lindeni* Hk. Sp. Fil. I. p. 193 (1846).

PUNGO ANDONGO.—On wet shady rocks in Barrancas de Catete near the præsidium. In fr. Dec. 1856. No. **77**.

This cannot be distinguished from the South American species to which Mettenius referred it. *D. concinna* Schrad. from South Africa has the pinnæ decreasing downwards as well as upwards, while the fronds of *D. thecifera* H.B.K., are sub-deltoid, with the pinnæ largest at the base. *D. Schimperi* Hk. is a synonym of *D. concinna* Schrad. There are specimens of *D. thecifera* H.B.K. in Herb. Mus. Brit., from Madagascar collected by the Rev. Deans Cowan, and from Equatorial Africa, east of Kiriandusi, 6100 ft., collected by Dr. J. W. Gregory.

6. **ADIANTUM** Linn. Gen. Pl. p. 322 (1737).

1. **A. lunulatum** Burm. Fl. Ind. p. 235 (1768); Hk. & Bak. Syn. Fil. p. 114.

SIERRA LEONE.—In woods at the base of Sugarloaf Mountain behind Freetown; Sept. 1853. No. **5**.

GOLUNGO ALTO.—Not abundant on the banks of the Calolo, among the mountains of Mongollo; Sept. 1854. No. **149***c*.

2. **A. Mettenii** Kuhn, Fil. Afric. p. 64 (1868).

A. pteropus R. Br. in Herb. Mus. Britt.

GOLUNGO ALTO.—Sparsely in shaded places at the rocky springs of Capopa, near Canguerasange; 1 Dec. 1854. No. **150**. On the shaded sides of the road between Cacarambolo and N-dele, frequent, but rarely fruiting; Aug. 1855. No. **150***b*. In shady woods in the

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mountains of Queta, by the side of torrents but not frequent; Oct. 1854, Aug. 1855. No. **150***c*.

Welwitsch distinguished this as a species, and gave it a name in his Herb. It had been raised to this rank by R. Brown, from specimens collected in the Congo region by Chr. Smith, and his herbarium name *A. pteropus* has been quoted in books. The striking character which suggested Brown's name is the broad wing on the short stalk of the pinnæ, which also passes down the rachis.

3. **A. Zollingeri** Mett. teste J. E. Bommer.

PUNGO ANDONGO.—On schistose rocks near M-popo, not far from the banks of the river Cuanza. In fr. April 1857. No. **149**. In a single place, but there abundant on shaded moist rocks near Rio Mangue; 31 Jan. 1857. No. **149***b*.

4. **A. Capillus Veneris** Linn. Sp. Pl. p. 1096 (1753); Hk. & Bak. Syn. Fil. p. 123.

CAPE DE VERDE ISLANDS.—Frequent in humid places in the interior of the Isle of St. James; in fruit Jan. 1861. No. **71**.

GOLUNGO ALTO.—Common at springs, on humid banks, etc. Growing all the year round. At cataracts of the river Cuango; Aug. 1855. No. **151**.

BUMBO.—Frequent on river banks in shady places of the Serra da Xella; in fr. Oct. 1859. No. **200**.

7. **LONCHITIS** Linn. Gen. Pl. p. 522 (1737).

1. **L. occidentalis** Baker, Syn. Fil. p. 128 (1867).

L. glabra Hk. f. (non Bory), Journ. Linn. Soc. vii. p. 234. *L. glaberrima* Mett. in Kuhn, Fil. Afr. p. 81. (1868).

GOLUNGO ALTO.—4 to 8 ft. high, generally 5 ft. In the woods, chiefly near the rivers of Sobati de Quilombo, 2500 to 2800 ft. high; in fr. July 1856. No. **132***a*. Woods of Mata de Quisucula, Sobati de Bango Aquitamba; 29 April 1856. No. **132***b*.

Welwitsch observes that as the sori are not limited to the sinus, but extend up the margins, even to the apex of the lobes, this species exhibits a transition from *Lonchitis* to *Pteris*.

8. **CHEILANTHES** Swartz, Syn. Fil. p. 5, 126 (1806).

1. **C. Kirkii** Hk. Second Cent. Ferns, tab. lxxxi. (1861).

GOLUNGO ALTO.—Very rare on the mossy banks of the cataracts near Pedra Cabondo; in fr. Nov. 1856. No. **142**. In the shady margins of the road from Sange to the source of the Capopa, 2000 ft.; Dec. 1856. No. **143**.

HUILLA.—On shaded rocks near the cataract of Ferrão de Sola near Lopollo.

This is *Pellæa geraniifolia* Fée with the rounded distinct indusia of *Cheilanthes*. Welwitsch says that a true indusium is present, which appears not to be formed from the edge of the frond; this would transfer it to the genus *Pteris*, where Kuhn places it, but it is, in my judgment, a true *Cheilanthes*.

2. **C. hirta** Sw. Syn. Fil. p. 128 (1806).

HUILLA.—On wooded banks near the stream that flows from Morro de Lopollo; Nov. 1859. No. **202**.

3. **C. Welwitschii** Hook. in Hk. & Bak. Syn. Fil. p. 142 (1868); non *C. lutea* Moore, Ind. Fil. p. 246.

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HUILLA.—In the mountains of Morro de Monino between the river Monino and the great lake of Ivantâla, 5600 ft.; in fr. Feb. 1860. No. **198.**

PUNGO ANDONGO.—Frequent at the source of the Cazamba towards Catete; Dec. 1856. No. **148.**

4. **C. farinosa** Kaulf. Enum. Fil. p. 212 (1824); Hk. & Bak. Syn. Fil. p. 142.

HUILLA.—In the mountains of Morro de Monino; in fr. Apr. 1860. No. **201.**

9. **PELLÆA** Link, Fil. Sp. Hort. Berol. p. 59 (1841).

1. **P. pectiniformis** Baker, Syn. Fil. Ed. 2, p. 147 (1874).

HUILLA.—Not frequent in the marshy banks of the streams. On the mountains of Serra de Oiahoia, near Humpata, 5000 to 5500 ft. high; in fr. May 1860. No. **191.**

2. **P. Doniana** Hook. Sp. Fil. ii. p. 137 (1858).

PUNGO ANDONGO.—Not frequent among stones and short grass of the præsidium; April 1857. No. **135.**

GOLUNGO ALTO.—Rare at the margins of forests above the sources of the Capopa, Sobati de Bumba, July 1855. No. **136.** In the rainy season this fern is intensely glaucous green, in the dry season the pinnæ become contracted and involute, and look as if they were linear.

3. **P. hastata** Link, Fil. Sp. Hort. Ber. p. 60 (1841); Hk. & Bak. Syn. Fil. p. 152.

Pteris viridis Forsk. Fl. Ægypt.-Arab. p. 186 (1775).

HUILLA.—On dry and moist rocks between Humpata and Lopollo. Jan., with fr. April 1860. Nos. **183**, **183***b*, **183***c*.

A small plant from the same locality growing among *P. hastata* and *P. calomelanos* (No. **183***d*) possesses characters common to the two plants which led Dr. Welwitsch to question the value of the species. This plant has the habit of *P. hastata* Link., but the segments are scarcely subcrenate, the rachis is not winged, and the veins in the segments are inconspicuous as in *L. calomelanos* Link. Welwitsch suggests that it may be the plant named *Pteris leucomelas* Mett. in Kuhn, Fil. Afr. p. 83.

4. **P. calomelanos** Link, Fil. Sp. Hort. Ber. p. 61 (1841); Hk. & Bak. Syn. Fil. p. 152.

HUILLA.—In rocky woods near Mumpulla but sparsely. Serra Oiahoia at its base; Oct. 1859. No. **181.** In damp rocky places between Lopollo and Nene towards Empalanca; Feb., in fr. May 1860. No. **182.**

5. **P. dura** Hk. Sp. Fil. ii. p. 139, tab. cxiii. (1858).

P. Burkeana Baker, Syn. Fil. p. 153 (1868).

HUILLA.—On scattered rocks in woody places between Lopollo and Nene. In fr. April 1860. No. **178.**

10. **PTERIS** Linn. Gen. Pl. p. 322 (1737).

1. **P. longifolia** Linn. Sp. Pl. p. 1074 (1753).

GOLUNGO ALTO.—At the cataracts on the river Cuango; Dec. 1854. Frequent by the margins of the rivulets of Cuango and Aniopozo, near

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Sange, 2000 to 2500 ft.; rare in the rest of Angola. In fr. May to July 1855 and 1856. No. **133**.

BUMBO.—By rivulets in the shady primitive woods of the Serra da Xella; Oct. 1859. No. **204**.

2. **P. cretica** Linn. Mantissa, p. 130 (1767).

BUMBO.—In shady places beside rivulets in the Serra da Xella between Chaõ da Xella and Arruial do Caionda, not common except in one locality, Oct. 1859. No. **179**

3. **P. quadriaurita** Retz. Obs. Bot. Fasc. vi. p. 38 (1791).

ST. THOMAS.—In shady humid wood, on rocks about 1200 ft., frequent but not in fruit. Dec. 1860. No. **54**.

GOLUNGO ALTO.—In the drier woods of Alta Queta; May 1855. Aug. 1855. No. **137**. At the falls of Capopo, Sobado de Bumba; young plants Aug. 1855. No. **137***a*. In rabbit burrows in the forest of Mussengue, June 1856. No. **137***d*. In humid shady palm forests on the right side of the river Cuango; in fr. July 1855. No. **138**. 3 to 4 ft. high.

4. **P. flabellata** Thunb. Prod. Pl. Cap. p. 172 (1800).

HUILLA.—Not infrequent in marshy woods between Lopollo and Humpata; March and April 1860. No. **177**.

5. **P. aquilina** Linn. Sp. Pl. p. 1075 (1753).

ST. THOMAS.—Frequent in the plantations of *Coffea arabica* near Fazenda de Monte Caffé; without fr. Dec. 1860. No. **59**.

This is a glabrous plant growing vigorously in cultivated ground, which Dr. Welwitsch was inclined at first to recognise as a distinct species.

Var. β **lanuginosa**.

PRINCE'S ISLAND.—In woods on Pico de Papagaio, frequent; Sept. 1853. No. **18**.

SIERRA LEONE.—Frequent in upland woods behind Freetown; Sept. 1853. No. **6**.

Forma glabrior.

ST. THOMAS.—In woods on lands neglected after cultivation; Dec. 1860. No. **57**.

HUILLA.—In neglected fields, now covered with wood, between Monino and Lopollo; Feb. and April 1860. No. **180**.

Var. γ **caudata**.

GOLUNGO ALTO.—In upland fields formerly cultivated of Alta Queta, and frequent on the dry plains of Sobato de Bumba; May and June 1856. No. **134**.

6. **P. biaurita** Linn. Sp. Pl. p. 1076 (1753).

SIERRA LEONE.—Not infrequent in moist places by the rivers near Freetown; Sept. 1853. No. **7**.

PRINCE'S ISLAND.—Near rivers among palms near the shore; Sept. 1853. No. **226**.

7. **P. atrovirens** Willd. Sp. Pl. v. p. 385 (1810).

PRINCE'S ISLAND.—In very shady woods of Pico de Papagaio; Sept. 1853. No. **22**.

GOLUNGO ALTO.—Not infrequent in dense woods near Canguera-sange; Oct. 1854 and Sept. 1855. No. **139**.

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PUNGO ANDONGO.—In shady woods of Barranco de Songare ; without fr. May 1857. No. **140.**

8. **P. spinulifera** Schum. Vid. Sel. Phys. Kjöb. iv. p. 233 (1829).

ST. THOMAS.—In shady forests around Monte Caffé, 2500 ft. ; in fr. Dec. 1860. No. **53.**

GOLUNGO ALTO.—Beside rivers in the woods of Barranco do Sangue ; in fr. April 1855. No. **141.**

11. **CERATOPTERIS** Brongn. Bull. Soc. Phil. 1821 p. 186 (1821).

C. thalictroides Brongn., *l.c.*

ICOLO E BENGO.—In marshy places at the margin of the lake called Lagoa de Quilunda, near Prata ; 14 Sept. 1854. No. **82.**

12. **LOMARIA** Willd. in Ges. Nat. Fr. Mag. iii. p. 160 (1809).

L. Boryana Willd. Sp. Pl. v. p. 292 (1810).

Blechnum tabulare Kuhn, Fil. Afr. p. 94.

HUILLA.—In mountainous districts near the banks of rivulets ; April 1860. No. **203.**

13. **ASPLENIUM** Linn. Gen. Pl. p. 322 (1737).

1. **A. sinuatum** Beauv. Fl. d'Oware, ii. p. 33, Pl. 69 (1807).

PRINCE'S ISLAND.—Sept. 1853. No. **24** in part.

Var. Fronds narrow, veins oblique, sori not reaching midrib or margin.

PRINCE'S ISLAND.—On trunks of trees in very shaded places of the Pico de Papagaio, somewhat rare ; Sept. 1853. No. **24**, in part.

ST. THOMAS.—On old trunks in the densest woods ; sparsely fruiting Dec. 1860. No. **64.**

2. **A. longicauda** Hook. Second Cent. Ferns, tab 69 (1861).

ST. THOMAS.—Frequent in shady woods, about 1800 ft. high. In fr. Dec. 1860. No. **63.**

3. **A. emarginatum** Beauv. Fl. d'Oware ii. p. 6, Pl. 61 (1807).

GOLUNGO ALTO.—In the dense natural woods of Caculungula, Sobato de Quilombo Quiacatubia. Fruiting specimens very rare. Jan. 1855. No. **98.** Specimens also from Bembe, Congo, collected by Monteiro, 1858, in Herb. Welw.

4. **A. angolense** Baker, Syn. Fil. p. 485 (1874).

PUNGO ANDONGO.—In the shady natural woods of Mata de Quibanga near Sange ; Aug. 1855. No. **96.**

5. **A. Geppii** Carruth.

Welwitsch, as Mr. Gepp pointed out to me, gave a trivial name to this species which had already been used.

Stipes tufted, 3 to 6 in. long, clothed when young with lanceolate acuminate caducous scales, erect, pale-coloured ; frond 4 to 15 in. long, 2 to 6 in. broad, with 5 to 10 pinnæ on each side, which are 1 to $3\frac{1}{2}$ in. long, and $\frac{3}{8}$ to $\frac{3}{4}$ in. broad, stalked, apex acuminate, cuneate at the base, the lower half more oblique, the two sides of the pinna nearly equal, margin crenate or bluntly serrate, terminal pinna somewhat larger than the others ; veins bifurcate except towards the apex of the pinna ; sori and indusium linear, not reaching the margin.

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The sori are short in the smaller specimens, and give to this fern the aspect of *A. anisophyllum*, but it is more nearly allied to *A. Prionotis*, having its indusium and sori linear.

PUNGO ANDONGO.—Chiefly on shady rocks in the natural wood called Mata de Pongo ; Feb. and April 1857. No. **97**.

6. **A. macrophyllum** Sw. Syn. Fil. pp. 77, 261 (1806).

PRINCE'S ISLAND.—On shady banks in Pico de Papagaio, with orchids, and *Gleichenia Hermanni* R. Br. Sept. 1853. No. **14**.

GOLUNGO ALTO.—Somewhat rare in the very dense natural woods of Alto Queta ; July 1855. No. **86**.

7. **A. erectum** Bory in Willd. Sp. Pl. v. p. 328 (1810).

GOLUNGO ALTO.—Round the source of the Capopo ; Oct. 1854 ; not infrequent in rainy seasons, on the shady banks of the rivers in the mountains of the Alto Queta ; at the end of May 1855. In shady woods by the river of Quibôlo, mountains of Queta ; 19 March 1856. No. **87**. Common throughout all the mountain region of Angola and there, at least, not so variable as other species of the genus.

PUNGO ANDONGO.—On the shaded hilly places of Pedra Songue ; Dec. 1856. No. **94**.

8. **A. inæquilaterale** Willd. Sp. Pl. v. p. 322 (1810).

A. brachyotus Kunze, in Linn. x. p. 512.

PUNGO ANDONGO.—By the banks of rivers, at the præsidium, not common ; Jan. 1857. No. **95**.

This may be at once distinguished from the preceding species by the pinnæ not decreasing in size downwards.

9. **A. resectum** Smith, Ic. ined. Fasc. iii. tab. 72 (1791).

CAZENGO.—By Muxaûlo river in the mountain of the same name. The most beautiful species of *Asplenium* ; 12 June 1856. No. **88***a*. In a single locality, but abundant ; on the rocks near the source of the Capopa, not far from Canguerasange ; Oct. 1854. No. **88***b*. In the primeval forest of Quisucûlo ; 8 Sept. 1855. No. **88***b*.

10. **A. formosum** Willd. Sp. Pl. v. p. 329 (1810).

GOLUNGO ALTO.—On the left of Cuango river, between Cacarambola and N-dele. among palms ; Dec. 1855. No. **93***a*. In the woods of Sobati de Bumba, near the source of the Capopo, but not frequent ; Aug. 1855. No. **93***b*.

PUNGO ANDONGO.—On the volcanic hills near M-popo, not far from the banks of the Cuanga River ; Feb. 1857. No. **93***c*.

11. **A. adiantoides** Lam. Encyc. Meth. ii. p. 309 (1786).

A. falsum Retz. Observ. vi. p. 38 (1791). *A. furcatum* Thunb. Prod. Pl. Cap. p. 172 (1794). *A. præmorsum* Sw. Fl. Ind. Occ. iii. p. 1620 (1806).

PUNGO ANDONGO.—On the rocky heights of Pedras de Guinga in mossy shaded places ; Jan. 1857. No. **85**. In rocky places of the præsidium ; Dec. 1856. No. **89**, in part. In shaded rocky places of Pedra Cazella, but very rare ; Feb. and April 1857. No. **90**. On shaded rocks near Muta Lucala, at Cuanza river, but not abundant ; March 1857. No. **90***b*.

GOLUNGO ALTO.—Somewhat rare among rocks in the woods of Alta Queta in shady sub-humid places ; 13 Nov. 1855. No. **91**. In somewhat dense woods of Sobati de Bumba above the source of the Capopa, but rare ; end of Aug. 1855. No. **91***b*.

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HUILLA.—On rocks on the highest ridges of the Serra da Xella; Oct. 1859, June 1860. No. **195**. In rocky thickets of Morro de Lopollo; Feb. and May 1860. No. **195***b*.

12. **A. lividum** Mett. in Linnæa, xxxvi. p. 100 (1869).

PUNGO ANDONGO.—Among rocks north-east of the præsidium in very shaded places, growing with *Cheilanthas Welwitschii*; Dec. 1856. No. **89**, in part. In fissures of the rocks of Pedra de Cabondo; Feb. 1857. No. **101**.

13. **A. brachypteron** Kze. in Linn. xxiii. p. 232 (1850).

PUNGO ANDONGO.—On wet rocks near the Casalalé in Barrancos da Pedra Songue; April 1857. No. **92**.

Welwitsch distinguished a form growing with this and collected at the same time, characterised by the pinnæ not being so obviously dimidiate and having the segments more deeply pinnatifid. No. **92***b*.

14. **A. Welwitschii** Hook. in Hk. & Bak. Syn. Fil. p. 235 (1868).

GOLUNGO ALTO.—Very rare in the forests of Mata de Quisucula, by the streams with species of *Begonia* and *Marattia*; 29 April 1856. No. **100**.

15. **A. proliferum** Lam. Encyc. Meth. ii. p. 307 (1786).

A. decussatum Ser. in Schrad. Journ. Bot. ii. for 1800, p. 51 (1801).

ST. THOMAS'S ISLAND.—In the primitive forests near Fazenda de Monte Caffé, about 2500 ft.; with fr. Dec. 1860. No. **60**. Sub-arborescent, the stem about as thick as the corm, usually 2 in. in diameter, rising only a little above the ground; fronds 3 to 4 ft., rarely longer.

14. **ACTINIOPTERIS** Link, Fil. Sp. Hort. Berol. p. 79 (1841).

1. **A. radiata** Link, *l.c.*, p. 80 (1841).

PUNGO ANDONGO.—In sunny rocky places of the præsidium; Dec. 1856, Jan. and April 1857. No. **78**.

Of all the smaller ferns which Welwitsch saw in Tropical Africa this he considered the most elegant; scarcely 3 or 4 in. high, cæspitose, somewhat rigid, and where seen very rare.

BUMBO.—Not infrequent in rocky thickets not far from Chaõ da Xella, half way up the Serra da Xella. Never seen in the plains of Huilla. Oct. 1859. No. **163**.

2. **A. australis** Link, *l.c.*, p. 80.

PUNGO ANDONGO.—On the gneissic, bare, but humid rocks of the præsidium, frequent but only at Barrancos de Catete; Dec. 1856. No. **79**.

Probably a few lobed variety of *A. radiata*.

15. **DIDYMOCHLÆNA** Desv. in Gesellsch. Nat. Freunde Berlin Mag. v. p. 303 (1811).

D. sinuosa Desv., *l.c.*, (1811).

D. squamata Desv. Journ. Bot. vol. vi. p. 282 (1827). *D. lunulata* Desv. Journ. Bot. vol. vi. p. 282 (1827).

ST. THOMAS'S ISLAND.—In the bushy woods of Monte Caffé at an elevation of 2500 to 2800 ft. In fr. Dec. 1860. No. **67**. A sub-arborescent form with fronds 3 to 4 ft. long.

16. **NEPHRODIUM** Rich. in Marthe, Cat. Jard. Med. Paris, p. 120 (1801).

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1. **N. patens** Desv. Mem. Soc. Linn. Paris, vi. p. 258 (1827).

GOLUNGO ALTO.—On the banks of the Cate in Sobato de Bumba, rare and sporadic. In fr. at the beginning of Oct. 1855. No. **113**. By the rivulet Cuango, near Ponte do Felix Simoes. Nov. 1854. No. **130***a*. An elegant fern with the habit of *Aspidium unitum*, 3 to 4 ft. high, rigid.

2. **N. Spekei** Bak. Syn. Fil. p. 263 (1868).

PUNGO ANDONGO.—In shady places by the rivulet Calunda to the south of the rocks of the præsidium. Jan. 1857. No. **115**. Somewhat rare in shady places of the Mata de Pungo. No. **115***b*. On shady banks in the primitive woods of Mata de Pungo near the præsidium. Feb. 1857. No. **120**.

GOLUNGO ALTO.—In shady places in the primitive woods of Quisucula, near Bango. In fr. Sept. 1855. Beside the cataracts of Cuango, near Sange. Dec. 1854, Sept. 1855. No. **120** *bis*.

A young plant from Alta Queta (Jan. 1855, No. **121**), referred here doubtfully by Dr. Welwitsch, is certainly another species, but it is too young to determine.

3. **N. albo-punctatum** Desv. Mem. Soc. Linn. Paris, vi. p. 255 (1827).

PUNGO ANDONGO.—Somewhat rare in one place on gneissose rock, north-east of the præsidium behind Catete. Dec. 1856. No. **110**. A fern with a long, horizontally creeping rhizome, and erect somewhat rigid fronds.

HUILLA.—In somewhat humid rocky places of Morro de Lopollo, towards Empalanca. Feb. and May 1860. No. **193**.

4. **N. Thelypteris** Desv., *l.c.*, p. 257 (1827).

HUILLA.—Somewhat rare by the banks of the river Monino, almost hidden among tall *Cyperaceæ* ; in fr. April 1860. No. **185**.

5. **N. Welwitschii** Bak. Syn. Fil. p. 275 (1868).

Aspidium pinnatifido-serratum Mett. in Kuhn, Fil. Afr. p. 139 (1868).

GOLUNGO ALTO.—Very rare in shady places by the rivulets of the Serra de Alta Queta. Nov. 1854. No. **123**.

6. **N. athamanticum** Hk. Sp. Fil. iv. p. 125 (1862).

HUILLA.—In deep holes made by porcupines near the banks of the river Humpata. Feb. and April 1860. No. **194**. Cæspitose, 3 ft. high, erect, somewhat rigid, with the habit of European *Aspidia*. Indusium truly reniform.

7. **N. hirsutum** Don, Prod. Fl. Nep. p. 6 (1825).

Polypodium crenatum Forsk. Fl. Ægypt. p. 185 (1775). *N. eriocarpum* Dec. Ann. Mus. ii. p. 185 (1841). *N. odoratum* Baker, Syn. Fil. p. 280 (1868).

ST. VINCENT, CAPE DE VERDE ISLANDS.—On the volcanic rocks at the summit of Monte Verde. Sept. 1853. No. 1.

8. **N. subquinquefidum** Hook. Sp. Fil. iv. p. 130 (1862).

PRINCE'S ISLAND.—In woods in the mountains of the Pico de Papagaio, along with *Lycopodium cernuum*. Sept. 1853. No. **16**. Pinnules scarcely or not divided and generally obtuse.

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9. **N. variabile** Hook. Sp. Fil. iv. p. 140 (1862).

Aspidium speciosum Mett. in Ettingsh. Farnkr. p. 180 (1865). *N. Vogelii* Hook., *l.c.*, p. 130.

GOLUNGO ALTO.—By the banks of rivulets near Zengas do Queta. July 1856. Nos. **106**, **107**.

Dr. Welwitsch considered this to be a trifid variety of the previous species. It may easily be distinguished by the triangular outline of the lower pinnæ, in which the pinnule of the lower side is not abnormally large, so that the outline of the frond is deltoid acuminate or somewhat five-angled. It is very polymorphic. Young specimens in No. **107** are the form named by Hooker *N. Vogelii*.

10. **N. unitum** R. Br. Prod. Fl. Nov. Holl. p. 148 (1810).

PUNGO ANDONGO.—Frequent on the banks of the Cuanza between Condo and Quisonde, etc. A gregarious fern with creeping rhizomes 4 to 12 ft. long, erect fronds; sometimes floating on the water; in fr. March 1857. Very frequent on the shores of the island Calemba, March 1857. On the banks of the Cuanza, near Candumba. Jan. 1857. No. **111**.

GOLUNGO ALTO.—Frequent, but only in one place, on the marshy margins of the Casaballa in Sobato de Bumba, along with orchids and species of *Nauclea*. 22 Oct. 1855. No. **112**.

CAZENGO.—In marshes with *Cyperus* and *Papyrus* around Lagoa de Moembexe, near Dalatando; June 1855. No. **114**.

11. **N. venulosum** Hk. Sp. Fil. iv. p. 71 (1862).

PRINCE'S ISLAND.—In very dense woods from the sea-shore to 1000 ft.; frequently 3 to 7 ft. high; Sept. 1853. No. **21**.

GOLUNGO ALTO.—In spongy marshes on the banks of the Quiapose, near Canguerasange, close to the chief's residence, near the spring on the right bank; Oct. 1854. No. **117**. Near the streams in the primitive forests of Sobato de Quilombo Quiacatubia, in the locality where *Rhipsalis* is found; Jan. 1855. No. **118**. In the primitive forests of Quisucula; 9 Sept. 1855. No. **118***b*.

12. **N. molle** Desv. Mem. Soc. Linn. Paris, vi. p. 258 (1827).

Polypodium molle Jacq. Collect. iii. p. 188 (1789).

SIERRA LEONE.—Near Freetown in shady woods, frequent; Sept. 1853. No. **4**.

ST. THOMAS'S ISLAND.—In dense primitive forests beside rivulets, near Novo Destino; in fr. Dec. 1860. No. **61**. By rivulets in rocky places near Monte Caffé; Dec. 1860. No. **65**.

GOLUNGO ALTO.—On the banks near waterfalls of the river Cuango; in fr. early in Aug. 1855. No. **122**. On the densely grassy margins of the rivulet Quiapoze, near Sange, with *Pteris angustifrons*, but not frequent; April 1856. No. **129**. Sparingly on the banks of the rivulet Muria; 18 Sept. 1854. No. **129***b*. At the public fountain in Banza de Bango, with *Anthoceros* and *Marchantia*; 7 Sept. 1855. No. **129***c*. In the woods of Sobato de Quilombo Quiacatubia; July 1855. No. **130***b*.

HUILLA.—In shady woods of Parinaria Nocha, in moist places, flooded in summer. Lopollo, Feb. 1860. No. **196**.

13. **N. hippocrepis** Desv. in Mem. Soc. Linn. Paris, vi. p. 259 (1827).

Polypodium hippocrepis Jacq. Collect. p. 186 (1789). *Polypodium cicutarium* Linn. Syst. Nat. ed. x. p. 1326 (1759). *Nephrodium cicutarium* Baker, Syn. Fil. p. 299 (1868).

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PRINCE'S ISLAND.—By springs on shady rocks near the sea; Sept. 1853. No. **12**. Gregarious, but in few woody places about 1500 ft. between the city and Monte Caffé; in fr. Dec. 1860. No. **62**.

PUNGO ANDONGO.—Sparsely in shady places of Mata de Pungo; in fr. middle of March 1857. No. **102**.

GOLUNGO ALTO.—Very abundant at the falls of the river Coango in shady woods. Specimens with round tubercles on the main rachis on the upper or under surface of the frond are intermixed with the usual forms; in fr. Aug. 1855. No. **103**. and **103***b*.

A beautiful fern with cæspitose stipes and fronds 3 and 4 ft. high. The stipes and rachises in all the specimens collected in Golungo Alto were without glandulose hairs, while the specimens in No. 62 have them.

Two young plants belonging probably to *Nephrodium* were in Dr. Welwitsch's Herb.; one, No. **131**, from the banks of the river Casabala Sobato de Bumba, July 1856, the other, No. **184**, found near the cataract of Ferrão da Sola; April 1860.

17. **NEPHROLEPIS** Schott, Gen. Fil. (1834).

1. **N. tuberosa** Presl, Tent. Pter. p. 79 (1836).

Aspidium tuberosum Bory in Willd. Sp. Pl. v. p. 284 (1810).

SIERRA LEONE.—Frequent on old shady walls in Freetown, growing with various Hepatics and species of *Scytonema*; Sept. 1853. No. **8**.

Welwitsch notes that the sori in his specimens are on the margin of the pinnæ.

2. **N. exaltata** Schott, Gen Fil. (1834).

GOLUNGO ALTO.—Not infrequent on the old trunks of *Elæis guineensis* and other trees between Bango and Sange; in fr. Jan. and May 1855, and June 1856. No. **144**.

PUNGO ANDONGO.—On decaying bare trunks of *Melia Bombolo* Welw. in the præsidium itself; Dec. 1856. No. **145**.

These plants are always tuberifous; the tubers are ellipsoid, and contain a dense subflavescent flesh. Welwitsch considered the specimens to be only a variety of *N. tuberosa* Presl.

3. **N. biserrata** Schott, Gen. Fil. (1834).

N. acuta Presl, Tent. Pter. p. 79 (1836).

PRINCE'S ISLAND.—In dense humid woods, frequent. Full grown plants 6 to 7 ft. high; Sept. 1853. No. **23**.

GOLUNGO ALTO.—Very common in the shady woods of Quilombo Quiacatubia, about 2000 ft. altitude; in fr. Jan. 1855. In the primitive forests on palms, growing among the bases of the petioles, in the Serra do Alto Queta; in fr. June 1856. No. **108**.

Var. *β*, **diplotis** Welw. The base of the pinnæ equally auriculate on both sides.

PRINCE'S ISLAND.—From 100 to 500 ft. altitude; Sept. 1853. No. **23***b*.

4. **N. trichomanoides** J. Sm. in Hk. Journ. Bot. iii. p. 413 (1841); in Presl, Epim. Bot. p. 44 (with descr.) (1849).

N. repens Brack. U.S. Expl. Exped., Botany p. 209 (1854). *N. ramosa* T. Moore, Ind. Fil. p. 102 (1858). *N. obliterata* Hook (non *Nephrodium obliteratum* R. Br.) Sp. Fil. iv. p. 154 (1862).

ST. THOMAS.—Climbing on old living trunks in woods, to about

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2500 ft. on Monte Caffé, the apices of the fronds more or less patent; in fr. Dec. 1860. No. **55**.

18. **OLEANDRA** Cav. Descr. Pl. I. p. 252 (1802).

O. articulata Presl, Tent. Pterig. p. 78 (1836).

ST. THOMAS'S ISLAND.—In shady primitive woods around Fazenda do Monte Caffé, about 2000 ft. alt.; without fr. Dec. 1860. No. **52**.

Var. *β*. **Welwitschii** Baker, Syn. Fil. p. 303 (1868).

HUILLA.—Somewhat rare in woods near the waterfalls at the foot of Ferrão da Sola near Lopollo; Feb. and April 1860. No. **188**.

19. **POLYPODIUM** Linn. Gen. Pl. p. 322 (1737).

1. **P. proliferum** Koenig (non Kaulf. nec Presl) in Retz., Obs. Bot. vi. p. 38 (1791).

GOLUNGO ALTO.—Not frequent by the banks of the Mûria, between the place called Mûria and Trombeta, with a slender species of *Polygonum*; 18 Sept. 1854. No. **119**.

2. **P. Schimperianum** Mett. in Schweinf. Beitr. p. 303 (1867), and Kuhn, Fil. Afr. p. 152 (1868).

PUNGO ANDONGO.—On the rocky banks of the River Cazella between Pungo Andongo and Luxillo; in fr. Nov. 1856. No. **152**.

3. **P. simplex** Sw. in Schrad. Journ. Bot. ii. jur. 1800, p. 19 (1801).

P. excavatum Bory in Willd. Sp. Pl. v. p. 158 (1810). *P. sesquipedale* Kuhn, Fil. Afr. p. 153 (non Wall.).

PUNGO ANDONGO.—In shaded as well as exposed rocks of the præsidium near Catete and elsewhere; in fr. Jan. 1857. No. **104**. Growing with asparagus, thick-leaved orchids, etc., on the gneissose rocks. Fronds rigid, sori yellow.

4. **P. lycopodioides** Linn. Sp. Pl. p. 1082 (1753).

GOLUNGO ALTO.—Not infrequent, but not observed in many places, in dense woods of Serra do Alto Queta; in fr. Feb. 1855. No. **105**. Rhizome very long, climbing 10 to 20 ft. on the stems of old trees.

5. **P. irioides** Lam. Enc. Meth. Bot. v. p. 513 (1804).

P. punctatum Kuhn (non Sw.) Fil. Afr. p. 151.

PRINCE'S ISLAND.—Sporadic, on old trunks of trees in woods near the sea; in fr. Sept. 1853. No. **25**.

GOLUNGO ALTO.—Sporadic on the larger branches of old trees; without fr. April 1856. No. **99**.

6. **P. Phymatodes** Linn. Mantissa ii. p. 305 (1771).

PRINCE'S ISLAND.—On old trunks of palms and on the earth in densely shady places not far from the sea; Sept. 1853. No. **9**.

ST. THOMAS'S ISLAND.—On old trunks in the woods of Monte Caffé up to 2800 ft., not infrequent, Dec. 1860. No. **51**. This fern has a strong and pleasant fragrance.

7. **P. Willdenovii** Bory in Ann. Sc. Nat. Ser. i. vol. v. p. 468 (1825).

P. propinquum Hk. pro parte (non Wall.) Syn. Fil. p. 367.

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PRINCE'S ISLAND.—Growing, but rarely, on old tree trunks in the woods near the sea; Sept. 1853. No. **17**.

ST. THOMAS'S ISLAND.—Frequent on the old tree trunks in the woods of Monte Caffé from 2000 to 2500 ft.; Dec. 1860. No. **69**.

20. **NOTHOLÆNA** R. Br. Prod. p. 145 (1810).

N. inæqualis Kunze, Farrnkr. p. 146 (1840-47).

PUNGO ANDONGO.—On the rocks of Pedra Songue and in fissures in the rocks near Caghuy; end of March and beginning of April. In holes and fissures in the rocks of the præsidium (Pedra Cabondo). April 1857. No. **147**.

HUILLA.—On the scattered rocks in the plain called Empalanca between Lopollo and Humpata; Oct. 1859, May 1860. No. **197**.

21. **GYMNOGRAMMA** Desv. Berlin Mag. v. Jahrg. p. 304 (1811).

1. **G. cordata** Schlecht. Adumb. Pl. p. 16 (1825).

HUILLA.—Sparsely on the schistose rocks of Morro de Monino; in fr. April 1860. No. **190**.

2. **G. rosea** Desv. Berlin Mag. v. Jahrb. p. 306 (1811).

G. conspersa Kze. Farrnkr. p. 225 (1840-47). *G. argentea* Mett. in Kuhn, Fil. Afr. p. 59 (1868), Baker Syn. Fil. ed. ii. p. 385 (1874).

HUILLA.—Pendulous from the fissures of rocks of Morro de Monino; in fr. April 1860. No. **199**.

22. **VITTARIA** J. E. Smith, Mem. Acad. Turin. v. 413 (1793).

V. elongata Sw. Syn. Fil. pp. 109, 302 (1806).

PRINCE'S ISLAND.—On old trunks of palms in primitive woods; without fr. Sept. 1853. No. **13**.

23. **ACROSTICHUM** Linn. Gen. Pl. 322 (1737).

1. **A. Welwitschii** Baker, Syn. Fil. ed. ii. p. 521 (1874).

HUILLA.—On wet rocks at the cataracts near Ferrão do Sola, Lopollo; without fr. May 1860. No. **187**.

A cæspitose plant with subpendulous fronds.

2. **A. guineense.**

Lomariopsis guineensis Kuhn, Fil. Afr. p. 53 (1868). *L. marginata* Kuhn in Sched. Schweinfurth, Reise nach Trop. Afr. No. 3607. *Acrostichum sorbifolium* Hk. & Bak. Syn. Fil. p. 412 (1868).

ST. THOMAS'S ISLAND.—Not infrequent in the primeval woods about Fazenda, Monte Caffé; in fr. Dec. 1860. No. **68**.

3. **A. gaboonense** Hk. Sp. Fil. v. p. 270 (1874).

GOLUNGO ALTO.—In very shady primitive woods of the mountains Cungulungulo; Feb. 1855. No. **155**.

4. **A. Boivini** Welw. ms.

Chrysodium Boivini Mett. in Kuhn, Fil. Afr. p. 51.

GOLUNGO ALTO.—In shady places in the primitive woods of the Cungulungulo mountains, near Graça's house, Montalegre, in places where *Coffea arabica* is indigenous; in fr. Dec. 1855. No. **156**.

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5. **A. punctatum** Linn. Suppl. Pl. p. 444 (1781), non Linn. Sp. Pl. ed. ii. p. 1524 (1763), which is *Polypodium iriodes* Lam.

Swartz (Syn. Fil. p. 13) misquotes the Linnæan name as *punctulatum*, and this altered form has been followed by most authors.

ST. THOMAS'S ISLAND.—In very shaded woods above Fazenda de Monte Caffé; in fr. Dec. 1860. No. **58**.

GOLUNGO ALTO.—In the densely shaded and very elevated woods of Quilombo Quiacatubia; Jan. 1855. No. **153**.

The plant from St. Thomas's Island was named by Sir William Hooker *A. fluviatile*, but Welwitsch points out that it is obviously only a form and not a variety of *A. punctatum*. It has the main veins distinct, and consequently belongs to the *Gymnopteris* section of the genus.

Var. **angolense**.

A. angolense Welw. ms. *Chrysodium* sp. nov. Mett. in Kuhn Fil. Afr. p. 52.

GOLUNGO ALTO.—In the dry dense woods of the mountains of Cungulungulo, about 2800 ft. altitude, at Montalegre. No. **157**.

Welwitsch and Mettenius considered this fern should rank as a distinct species. Welwitsch separates it because the fronds are imparipinnate to the apex; the pinnæ are distinctly petiolate, and a bulbil is found at the base of the last pinna. The pinnæ of the upper part of the frond are subsessile; they have in the barren frond long acuminate apices, while the pinnæ of the fertile fronds are three or four times narrower, and shortly acuminate.

In all essential characters this plant so closely agrees with *A. punctatum* that it seems to deserve a place only as a variety of that species.

6. **A. Afzelii**.

Hemionitis acrostichoides Afzel. in Sw. in Schrader, Journ. Bot. (1800) ii. p. 17 (1801). *Polybotrya acrostichoides* Mett. in Kuhn Fil. Afr. p. 52.

ST. THOMAS'S ISLAND.—On Monte Caffé along with specimens of *Asplenium longicauda* Hk.; without fr. Dec. 1860. No. **636**.

PUNGO ANDONGO.—On shaded banks near the cataract of Cabondo; in fr. May 1857. No. **154**.

Fronds dimorphous, coriaceous, rhizome extensively creeping horizontally.

This fern is nearly allied to *A. contaminans* Wall. one of the species included by Mr. Baker in *A. virens* Wall. In *A. contaminans* the two, three, or four secondary veins run out from the vein free, while in the African species the meshes of the secondary veins continue to or almost to the margin, and only the veinlets reach the margin free.

7. **A. aureum** Linn. Sp. Pl. p. 1069 (1753).

PRINCE'S ISLAND.—By the rivulets near the sea-coast, and with *Rhizophora*; Sept. 1853. No. **15**.

BARRO DO DANDE.—Frequent, forming masses in the brackish places, often with *Rhizophora*, and *Drepanocarpus* at the mouth of the river Dande; in fr. Sept. 1858. No. **158**.

A noble fern, with a creeping rhizome, often nearly as thick as a small arm; fronds 3 to 6 ft. high, with coriaceous pinnæ, the uppermost 5 to 7 ft., bearing the fruit. The fronds erect, rigid. Almost without doubt a halophyte.

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24. **PLATYCERIUM** Desv. in Annal. Soc. Linn. Paris, vi. p. 213 (1827).

1. **P. stemmaria** Desv., *l.c.* (*stemaria*).

PRINCE'S ISLAND.—On the trunks of old trees in the dense woods of the island. The most singular and beautiful of the African ferns; Sept. 1853. Nos. **20** and **20***b*.

AMBRIZ.—On the old trunks of *Adansonia* in the rocky woods between Ambriz and Quisembo; Nov. 1853; No. **160**.

For the synonymy of this and other species of *Platycerium* see Journ. Bot. 1900, p. 125.

2. **P. angolense** Welw. in Hk. & Baker, Syn. Fil. p. 245 (1868).

P. elephantotis Schweinf. Bot. Zeit. xxix. p. 361 (1871).

GOLUNGO ALTO.—Sparse on trunks of *Sterculia*, etc., in the primeval woods near Quilombo Quiacatubia; in fr. Jan. 1855. No. **160**. On trunks of palm, *Sterculia*, etc., near Sange; Jan. 1855. No. **160²**.

Welwitsch describes the pendulous fertile fronds as simple, not forked, obcuneate, very obtuse at the rounded dilated apex, and gradually decreasing towards the long base. These characters are given by Schweinfurth, and clearly shown in his woodcut. They fully justify the specific rank of these plants, though Mr. Baker in his New Ferns, p. 114 (1892), places the species under *P. stemmaria* Desv.

25. **OSMUNDA** Linn. Gen. Pl. p. 322 (1737).

O. regalis Linn. Sp. Pl. p. 1065 (1753).

HUILLA.—In shaded marshy places at the waterfalls near Lopollo, with species of *Cyathea* and *Metroxylon*; 31 Oct. 1859. No. **165**.

26. **ANEMIA** Sw. Syn. Fil. pp. xiii. 155 (1806).

A. Schimperiana Presl, Suppl. Tent. p. 84 (1845).

A. tomentosa Sw. *β Schimperiana* T. Moore, Ind. Fil. p. 70 (1857).

HUILLA.—Seen only in rocky places of Morro de Monino at an altitude of 5600 ft.; in fr. at the end of April 1860. No. **164**.

27. **LYGODIUM** Sw. Journ. Bot. p. 107 (1801).

L. Smithianum Presl, Suppl. Tent. p. 112 (1845), Kuhn, Fil. Afr. p. 169.

GOLUNGO ALTO.—Rare in very dense woods of Mata de Mangue, near Sange; in fr. May and July 1856. No. **81**. In shady places in Alto Queta; in early state without fr. April, May, July and Aug. 1855. No. **80**.

28. **MARATTIA** Sw. Nov. Gen. et Sp. Pl. p. 128 (1788).

M. fraxinea Smith Ic. Ined. xlviii. (1790).

ST. THOMAS'S ISLAND.—Frequent in the primitive shady and humid forests near Monte Caffé, 2500 ft.; in fr. Dec. 1860. No. **70**.

GOLUNGO ALTO.—Very rare in the humid shady woods on the mountains of Alto Queta; in fr. June 1855. Mata de Quisucula; July 1867. No. **84**. Young fronds; Mata de Quisucula; 8 Sept. 1855. No. **84** *bis*.

29. **OPHIOGLOSSUM** Linn. Gen. Pl. p. 322 (1737).

1. **O. gramineum** Willd. Nova Acta Acad. Erfurt. ii. p. 18 (1802).

O. gracillimum Welw. ms. in Kuhn, Fil. Afr. p. 177 (1868).

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O. lusitanicum Linn. var. *gracillimum* A. Br. in Kuhn, Fil. Afr. p. 177 (1868).

PUNGO ANDONGO.—In bare pastures on the rocky banks of the rivers near Catete ; in fr. Jan. and Feb. 1867. Nos. **36***a*, **36***b*.

2. **O. luso-africanum** Welw. in Prantl in Eichler Jahrb. iii. p. 312 (1884).

PUNGO ANDONGO.—In pastures on gneissose rocks of the præsidium, 3500 ft. ; middle of Jan. 1857. No. **34**.

3. **O. Gomezianum** Welw. in Kuhn, Fil. Afr. p. 176 (1868).

PUNGO ANDONGO.—In bare pastures near the rivers, along with *O. rubellum* Welw., near Catete ; Jan. and Feb. 1857. No. **35**. In wet pastures, inundated in summer, on sandy mud with Xyrids, Antrolepids, Eriocaulons, and sedges, high up on Morro de Lopollo towards Empalanca ; in fr. April 1860. No. **161**.

4. **O. ellipticum** Welw. ms.

O. Gomezianum Welw. var. *latifolium* Prantl in Eichler Jahrb. iii. p. 316.

Rhizome cylindrical ; leaves ovate, obtuse or bluntly acute, opaque ; median nerve not pronounced, disappearing two-thirds along the lamina ; areolæ of the centre elongated, beyond as broad as long ; sporangia 5 to 8 on each row ; apex short, subacute.

PUNGO ANDONGO.—In bare pastures only on soil covering rocks by the river Tangue near Catete, along with *O. gramineum* Willd., but much less common ; Feb. 1857. No. **32**.

5. **O. rubellum** Welw. in Kuhn, Fil. Afr. p. 179 (1868).

PUNGO ANDONGO.—Frequent in bare pastures near the banks of the rivulets near Catete, and near Candumba on the river Cuanza ; Jan. and Feb. 1857. Nos. **33**, **33***b*.

6. **O. fibrosum** Schum. Dansk. Selsk. Afh. iv. p. 226 (1829).

PUNGO ANDONGO.—In rocky pastures in the primitive forests between Quibala and Cabanga ; in fr. 28 Dec. 1856. No. **31**. In similar pastures of Sierra de Pedras de Guinga to about 4000 ft. ; March 1857. No. **31***b*.

7. **O. reticulatum** Linn. Sp. Pl. p. 1063 (1753).

PUNGO ANDONGO.—In slopes with bare pasture of Pedra de S. Antonio in the præsidium ; in fr. Dec. 1856, Jan. and Feb. 1857. No. **28**. In bare and bushy pastures of Pedras de Guinga ; Jan. 1857. No. **29**.

ST. THOMAS'S ISLAND.—Not infrequent and gregarious in inundated pastures near the rivulet banks, scarcely 10 or 20 ft. above sea-level, and not far from the shore ; in fr. Dec. 1860. No. **30**.

EQUISETACEÆ.

EQUISETUM Linn. Gen. Plant. p. 322 (1737).

1. **Equisetum ramosissimum** Desf. Fl. Atlantica ii. p. 398 (1800).

Var. 16. **Burchellii** Milde, Monogr. Equis. p. 443 (1865).

E. Burchelii Vauch. Monogr. Prêles, p. 47. t. 10.

MOSSAMEDES.—Frequent in wet places at the mouth of the river Giraûl ; in fruit 18 July 1859. No. **176**.

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MOSSES.

BY ANTONY GEPP, M.A., F.L.S.

1. **SPHAGNUM** Dill. Hist. Musc. p. 240 (1741); Hedw. Fund. Musc. II. p. 85 (1782).

1. **S. africanum** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 216 (1871), t. i. fig. 1.

HUILLA.—Common in boggy spots by cold mountain rills, Morro de Lopollo and Morro de Monino at an elevation of 5500 ft.; without fr. in Dec. 1859 and April 1860. Nos. **11**, **12**.

2. **TREMATODON** Rich. in Mich. Fl. Amer. bor. II. p. 289 (1803).

1. **T. intermedius** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 226 (1871), t. iii. fig. 6.

HUILLA.—A fine moss, common and fruiting abundantly, on the muddy banks of the brook of Lopollo, tinging broad areas with a green-flavescent colour, short-lived, lasting barely three months, but continually renewing itself in the same damp spots; Feb. 1860. No. **9**. In caverns excavated by porcupines in woods of Proteaceæ between Lopollo and Monino; with fr. middle of May 1860. No. **20**.

Var. β. **nanus** Welw. et Duby, *l.c.*, p. 227.

PUNGO ANDONGO.—Gregarious but not not cæspitose; seta yellow; theca orange-red, ¹ to ¹ as long as the slightly arcuate apophysis. Rather rare, among Hepatics on moist ground in rocky places at an elevation of 3500 ft., Pedra Cazella; with fr. beginning of May 1857. No. **58**.

2. **T. angolensis** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 227 (1871), t. iv. fig. 5.

HUILLA.—In tufts of *T. intermedius* in pastures of short grass inundated in summer, among Cyperaceæ and Xyrideæ near Catumba, where also *Anagallis pumila* Sw. was collected; with fr. Dec. 1859. No. **47**.

3. **CAMPYLOPUS** Brid. Mant. Musc. p. 71 (1819).

1. **C. horridus** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 222 (1871), t. iv. fig. 1.

PUNGO ANDONGO.—On moist rather shaded rocks, Pedra Songue (Barranco grande); without fr. April 1857. No. **76**.

Also gathered at Lunda to the east of Casange by D. Livingstone and given by him to Welwitsch in May 1855. No. **116**.

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2. **C. Schwarzii** Schimper Bryol. Eur. Suppl. Fasc. i. ii. (1864).

HUILLA.—On woodland rocks on the way from Morro de Lopollo towards Humpata, at the spot where the first Ericaceous plant, *Blœria setulosa* (Herb. Welw. No. 2558), grows in plenty; May 1860. No. **35**. In marshy wooded places alongside streams near Humpata at an elevation of about 4500 ft.; without fr. May 1860. No. **40**.

3. **C. sciuroideus** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 220 (1871), t. ii. fig. 4.

HUILLA.—On rich soil covering the upper schistose rocks of Morro de Lopollo; without fr. April 1860. No. **10**.

PUNGO ANDONGO.—Very widely cæspitose; stems 3 in. to 1 ft. high; leaves shiny; on the upper rocks near Mata de Pungo, at an elevation of 3400 ft.; Dec. 1856, Feb. and May 1857. Frequent near Cazella in company with *Polytrichum*; Jan. 1857. No. **54**.

4. **C. montanus** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 221 (1871), t. iii. fig. 1.

HUILLA.—In wide tufts of a brilliant golden-green hue, on moist schistose rocks in elevated woods (5300 to 5600 ft.), Morro de Lopollo and Morro de Monino; without fr. at the beginning of April 1860. No. **3**. At the foot of old trees and on the ground contiguous in the woods of Monino, moist rocky spots at the great elevation of 5000 to 5500 ft.; without fr. May 1860. No. **5**.

5. **C. Æthiops** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 221 (1871), t. iii. fig. 2.

PUNGO ANDONGO.—On lofty moist rocks by the springs of Pedra de Songue where *Musa ventricosa* grows, at an elevation of 3400 to 3900 ft.; without fr. Feb. to April 1857. No. **64**.

4. **LEUCOPHANES** Brid. Bry. Univ. I. p. 763 (1826).

1. **L. unguiculatum** Mitt. in Journ. Linn. Soc. vii. p. 150 (1864).

PRINCE'S ISLAND.—At the base of palm-trunks (*Elæis guineensis*), gathered by Gustav Mann; without fr. No. **200**.

2. **L. (?) sphagnoides** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 443 (1872).

HUILLA.—Common in boggy spots among the elevated rocks of Morro de Monino; without fr. April 1860. No. **13**.

Duby (*l.c.*) quotes specimens gathered by Welwitsch in Pungo Andongo and by Livingstone in the kingdom of Lunda. The latter specimen is not in the British Museum set; and the former is probably represented by the following number:—

PUNGO ANDONGO.—A white glaucescent *Leucobryum*, very widely cæspitose, occurring in rather lax tufts 2 to 4 ft. wide and 2 to 7 in. deep, with branches few and very fragile; common in rocky thickety places within the præsidium, growing in company with fruticose *Orchideæ*, and forming a humus for them; always sterile; Dec., Feb., May 1857. No. **48**.

5. **OCTOBLEPHARUM** Hedw. Musc. Frond. iii. p. 15 (1791).

1. **O. albidum** Hedw., *l.c.*, p. 15, t. vi. A.

Bryum albidum L. Sp. Pl. edit. ii. p. 1583 (1763).

SIERRA LEONE.—On living trunks of *Mangifera indica* and *Dracœna*

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sp., not uncommon in woods composed of these trees, near Freetown, but sparingly with fr. Sept. 1853; gathered on an excursion interrupted by torrents of rain. No. **122**.

PUNGO ANDONGO.—On old tree-trunks in the denser primitive woods, but in no wise producing fruit every year; in the rainy season flavo-virescent, in the dry season silvery-white, glistening and becoming black; Mata da Pedra Pungo, within the præsidium; April 1857. No. **67**. Albido-virescent in the living state, but quite white when dried up; laxly cæspitose on the moist rocks of Pedra de Songue, at an elevation of 3500 ft.; without fr. April 1857. No. **67***b*. On the cleft rocks of Pedra S. Antonio within the præsidium, but sparingly; with fr. April 1857. No. **67***c*.

GOLUNGO ALTO.—On old palm-trunks (*Elœis guineensis*) in very dense moist woods near Calôlo; two or three capsules found with opercula; Sept. 1857. No. **130**. On various old trees, Mata de Quisucula; with fr. Feb. 1856. No. **130***c*.

6. **HYOPHILA** Brid. Bryol. Univ. I. p. 760 (1826).

1. **H. gymnostomoides** Jaeg. Gen. et Sp. Musc. I. p. 202 (1873).
Pottia gymnostomoides Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 226 (1871), t. iv. fig. 4.

PUNGO ANDONGO.—A gymnostomoid moss, occurring in wide, intensely green patches on shaded rocks near the cataract of the great river Cuanza near Condo; with fr. March 1857. No. **78**.

2. **H. compacta** Jaeg. Gen. et Sp. Musc. I. p. 203 (1873).
Pottia compacta Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 225 (1871), t. iii. fig. 5.

HUILLA.—A small, compactly pulvinate moss, almost black or greenish-black when alive and when dried, with capsule orange-yellow on a yellowish seta. In sandy woods of Proteaceæ, around and on the conical ant-hills of termites (*i.e.* Salalè) between Lopollo and Monino; with fr. April 1860.

PUNGO ANDONGO.—In open muddy spots in fissures of rocks by the great waterfall of the river Cuanza near Condo; with unripe fr. March 1857.

7. **BARBULA** Hedw. Fund. Musc. II. p. 92 (1782).

1. **B. unguiculata** Hedw. Musc. Frond. I. p. 59. t. 23 (1787); var. **apiculata** Br., Sch. et Guemb. Bry. Eur. II. t. 143, γ (1836-51).
B. apiculata Hedw. Sp. Musc. p. 117, t. xxvi. f. 1-3 (1801) var. ex Welw. et Duby in sched.

GOLUNGO ALTO.—On exposed rocks near Zensala de Bumba; with fr. May 1855. No. **133**. In exposed sparsely grassy places near Banza de Bango Aquitamba; with fr. May 1856. No. **134**. On shaded clayey soil in woods from Quibolo down to the western base of Alto Queta, at an elevation of 2100 ft.; with fr. June 1856. No. **135**.

Here should be added the three following numbers, at present indeterminate:—

PUNGO ANDONGO.—A humble little moss of dusky-green hue, very densely cæspitose, on the most lofty rocks of the præsidium, in the part called Pedra de Cazella; sterile, April and May 1857. No. **87**. A brown-green plant, densely cæspitose; shoots laxly aggregated, easily detached; on exposed wet soil near Catete; sterile, middle of May

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1857. No. **90**. In small quantity on moist ground in the more elevated rocky parts of Pedra de S. Antonio, within the præsidium; sterile, May 1857. No. **119**.

8. **SYRRHOPODON** Schwaegr. Suppl. II. i. p. 110 (1824).

1. **S. Welwitschii** Besch. in Ann. Sci. Nat. sér. 7, tom. i. p. 307 (1895).

Calymperes? Welwitschii Duby in Genéve, Mem. Soc. Phys. XXI. ii. p. 444, t. iv. fig. 8 (1872).

HUILLA.—On moist soil at the foot of rotting trunks in swampy woods near Humpata; without fr. May 1860. No. **6**.

Bescherelle (*loc. cit.*) has indicated the affinity of this plant to *Syrrhopodon Spruceanus* Mitt.

Another species, indeterminate, is represented by the following number:—

GOLUNGO ALTO.—On the base of trunks and on fallen branches on the ground in the primitive forests of Cungulungulo; sterile, July 1856. No. **129***c*.

9. **CALYMPERES** Swartz ex Weber, Tabula exhib. Calyptr. Operc. (1813).

1. **C. Afzelii** Swartz in Spreng. Schrad. et Link, Jahrb. d. Gewächsk. I. i. p. 3 (1818), c. tab.

GOLUNGO ALTO.—Cæspitose, bright green; stems erect; leaves widely sheathing, much crisped and twisted by drought; calyptra acutely angulate, flavescent; at an elevation of about 2000 ft. On palm-trunks (*Elœis guineensis*) in shady woods on the banks of the river Cuango; without fr. June 1856. No. **129**. Common, but rarely bearing fr. on palm-stems, etc.; found with fr. on *Raphia textilis* Welw. on Caminho (road) para Mussengue near Sange, on the eve of Welwitsch's departure, Aug. 1857. No. **129***b*.

10. **ZYGODON** Hook. et Tayl. Musc. Brit. ed. i. p. 70 (1818).

1. **Z. Welwitschii** Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 444. t. 1, fig. 7 (1872).

HUILLA.—A minute moss, remarkable for the many and prominent ribs on its capsule. A great rarity, found in one place only, very sparingly interspersed in tufts of *Brachymenium angolense*, on old trunks of a Sapotaceous kind of tree called "Mutambote" (*Chrysophyllum argyrophyllum*) in the mountain woods of Morro de Lopollo at an elevation of 5100 ft.; at the end of March 1860. No. **27**.

11. **SCHLOTHEIMIA** Schwaegr. Musc. Recent. Suppl. ii. p. 16 (1812).

1. **S. rugifolia** Brid. in Bryol. Univ. I. p. 322 (1826).

Orthotrichum rugifolium Hook. Musc. Exot. II. t. 128 (1820).

GOLUNGO ALTO.—In broad tufts on old trunks of a tree called "Muccamba-Camba" (*Ioxylon excelsum* Hiern, Herb Welw. No. 1559) in woody places near Sange, Dec. 1854. No. **132**. Cæspitose on tree-trunks in Queta Orient; gathered with a solitary capsule and a few fallen calyptras; July 1856. No. **132***b*.

PUNGO ANDONGO.—A widely cæspitose, fulvous-green moss,

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calyptras flavescent, splitting at base into eight regular subtruncate laciniæ. On branches of *Xerophyta squarrosa* Baker (Hb. Welw. No. 1555), often entirely enveloping them, on elevated rocks of the præsidium, seldom bearing fr., but found with fr. at Barranco de Catete ; April, May, 1857. No. **66**.

This species was previously known to occur in Brazil only ; and the original plant was gathered by Swainson near Rio de Janeiro, according to Hooker (Musc. Exot. t. 128). Hooker's Herbarium, however, affords reason for the belief that the original locality was Bahia. The African plant appears to differ from the Brazilian as redescribed by C. Mueller (Synops. I. p. 761) in the lighter colour (yellowish brown), more laciniate base and less rough (merely scab-ous) apex of the calyptra.

12. **MACROMITRIUM** Brid. Mant. Musc. p. 132 (1819).

1. **M. tenue** Brid. Bryol. Univ. I. p. 740.

Orthotrichum tenue Hook. et Grev. in Brewster's Edinburgh Journ. I. p. 120, t. v. (1824).

PUNGO ANDONGO.—A blackish-green, densely cæspitose moss, closely enveloping the upper branches of *Xerophyta squarrosa* Baker, Hb. Welw. No. 1555 ; common, but very seldom producing fruit owing to the exposed situation it occupies on unsheltered rocks in the fierce heat of the sun ; Pedra de Cansambe, within the præsidium ; with fr. in very small quantity, 3 May 1857. No. **53**. A few specimens found on a half-dry branch which had fallen from an old tree in the primitive wood called Mata de Pungo, within the præsidium ; with fr. beginning of June 1857. No. **86**.

2. **M. lycopodioides** Schwaegr. Spec. Musc. Suppl. II. ii. p. 141, t. 193 (1827).

Orthotrichum lycopodioides Burchell, Catalog. Geogr. Plant. Afr. Austr. Extratrop. ms. No. 5144-47.

HUILLA.—Very common ; growing with *Braunia arbuscula* (No. 32) on old trunks which are bearded with *Usnea* and *Physcia* on the summit of Serra da Xella, where Welwitsch often saw it bearing fruit on a species of *Tarchonanthus* and other trees ; gathered in a very dry and fragile state with fr. June 1860. No. **19**. (The British Museum specimen has no fruit). A very dry and brittle moss with a conical straightly rostrate operculum and hardly any peristome except a very short white membrane ; mingled in tufts of *Braunia arbuscula* (No. 32), but much more slender than that plant ; in company with various Lichens on branches of old trees on the highest parts of Serra da Xella at an elevation of about 4000 ft. ; with fr. June 1860. No. **198**.

GOLUNGO ALTO.—Growing with *Erythrodontium* on old trunks, especially of *Edwardia lurida*, in rocky woody parts of Sobato de Quilombo-Quiacatubia ; with fr. July 1856. No. 144.

13. **EPHEMERUM** Hampe in Flora XX. p. 285 (1837).

1. **E. æthiopicum** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 443. t. iii. fig. 8 (1872).

GOLUNGO ALTO.—Cæspitose, yellowish green, springing from a basal weft of confervoid protonematous filaments ; theca subsessile, turning red at maturity ; on clayey sandy soil by the roadside between Sange and Bango ; with fr. Dec. 1855. No. **155**.

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14. **FUNARIA** Schreb. Gen. Plant. p. 760 (1791).

1. **F. hygrometrica** Hedw. Sp. Musc. p. 172 (1801).

ISLAND OF ST. THOMAS.—Laxly cæspitose, growing with various Bryoid mosses and occurring principally on half-burnt, half-rotten trunks in woods on Monte Caffé at an elevation of about 2500 ft.; with fr. Dec. 1860. No. **127**.

Also collected in woods in the kingdom of Lunda to the east of the district of Casange and given to Welwitsch by Livingstone, May 1855. No. **115**.

15. **PHILONOTIS** Brid. Bry. Univ. II. p. 15 (1827).

P. spongiosa.

Bryum spongiosum Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 218, t. i. fig. 3 (1871).

Anomobryum spongiosum Jaeg. Gen. et Spec. Musc. I. p. 603.

PUNGO ANDONGO.—A densely cæspitose, brilliantly green moss occurring in spongy pulvinate tufts on wet gneiss rocks; frequently visited by Welwitsch, but always found in the sterile state; at the cataracts above Calunda in the most lofty parts of the præsidium, Oct. 1856; by rills in Mata de Pungo, Nov. 1856, and Feb., April and middle of May 1857; near Cabondo, Jan., Feb., March 1857; by the springs of Pedra Cabondo, Dec. 1856, Feb. and May 1857; by the cataracts of the præsidium, March 1857. No. **61**. Closely associated with *Bryum argenteum* (No. 70) on wet rocks by the rivulet in Barranco de S. Antonio within the præsidium, always sterile, May 1857. No. **62**. Also Alga No. **152**.

The stems of this moss are usually branched at base, bearing long (2 cm.) simple branches which are straight or curved at apex, and tomentose below; leaves congested at apex; the mature leaves exceed 1 mm. in length and are slightly papillate on the upper surface; the nerve is shortly excurrent at apex and decurrent at base, and the margin is narrowly revolute along the whole of one side and in the middle of the other side; the basal cells near the nerve are large and lax and those near the margin are shorter, quadrate and subobscure; the upper cells are lax and the contracted primordial utricle in them is persistent; inflorescence not observed.

Some of the specimens under Welwitsch's No. 61 may turn out to belong to another species, with stems more branched, less tomentose.

Among the indeterminate specimens belonging to this genus are the following numbers:—

HUILLA.—On the roots of old trees and on rocks close by, near rivulets in rather dense woods, near Catumba; sterile, April 1860. No. **29**, in part.

PUNGO ANDONGO.—On rocks by rivulets in forests of Cæsalpiniæ and Acaciæ, near Pedras de Guinga; sterile, Jan. 1857. No. **57**. Very bright green, widely cæspitose, providing a suitable basis for the growth of terrestrial Utriculariæ; on the sides of the Casalalé river within the præsidium; sterile, March 1857. No. **79**.

GOLUNGO ALTO.—On shaded moist ground by the rivulet of Quibôlo; sterile, 19 March 1856. No. **156**. A moss never found in the fruiting state though visited at different periods; on the margins of the ferruginous spring near Bango-Aquitamba, end of April and in Nov. 1856. No. **182**. On rocks covered with a spongy crust of sandy mud alongside the springs near Sange; sterile, Feb. 1855. No. **188**.

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16. **BRACHYMENIUM** Hook. ex Schwaegr. Spec. Musc. Suppl. II. i. p. 131 (1824).

1. **B. angolense** Jaeg. Gen. et Spec. Musc. I. p. 579 (1875).

Bryum (*Brachymenium*) *angolense* Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 219, t. i. fig. 4 (1871).

HUILLA.—A widely cæspitose moss; stems very densely woven together by an abundance of dark red fibrils; leaves imbricate, piliferous at apex; capsule elliptic, dark red, borne on a straight straw-coloured seta; operculum obtusely conic, shortly mamillate; on rather old trunks of a Sapotaceous tree called by the negroes "Mutambote" (*Chrysophyllum argyrophyllum*) on the way from Morro de Lopollo towards Nene, at an elevation of 5300 ft.; with fr. at end of March 1860. No. **26**. On the base of old trunks in forests, near Lopollo, without fr. May 1860. No. **37**.

2. **B. Welwitschii** Jaeg. Gen. et Spec. Musc. I. p. 581 (1875).

Bryum (*Brachymenium*) *Welwitschii* Duby in Genève, Mém. Soc. Phys. XXI. i. p. 219, t. ii. fig. 3 (1871).

PUNGO ANDONGO.—A flavo-virescent, widely cæspitose moss of splachnoid habit, growing in elevated rocky bogs; very rare and noticed by Welwitsch in one spot only, in Barranco de Catete; with fr. May 1857. No. **56**.

17. **BRYUM** Dill.; Br., Sch. et Guemb. Bry. Eur. IV. (1836-51).

1. **B. coronatum** Schwaegr. Sp. Musc. Suppl. I. ii. p. 103 (1816).

HUILLA.—By no means common in the shortly grassy pastures of Empalanca, flooded in the rainy season, at an elevation of about 5600 ft., on the Huilla plateau; with fr. May 1860. No. **24**. Near Lopollo, April 1860. No. **7***b*.

PUNGO ANDONGO.—Common, but sparingly with fruit, in rifts of the higher rocks of Pedras de Guinga; March 1857. No. **59**. By the great cataract of the Cuanza River near Condo; with unripe fr. March 1857. No. **206**.

ISLAND OF ST. THOMAS.—A luxuriant form occurring on fallen half-burnt half-rotten trunks in woods at an elevation of 2500 ft. in the locality called "Monte Caffé," growing with a sterile species of *Orthodon*; with fr. Dec. 1860. No. **126**.

Also gathered at Freetown in Sierra Leone by Vogel.

2. **B. argenteum** Linn. Sp. Plant. p. 1120 (1753).

PUNGO ANDONGO.—In wide tufts on volcanic rocks near Cabondo within the præsidium; with fr. end of Feb. 1857. Nos. **70** and **70***b*.

3. **B. squarripilum** C.M. in Flora LXIX. p. 280 (1886).

PUNGO ANDONGO.—In rifts of rocks at an elevation of about 4000 ft., Serra de Pedras de Guinga; with immature fr. Jan. 1857. No. **63**. On rocks near the base of Pedra Cabonda within the præsidium, not uncommon but sparingly with fr.; Dec. 1856. No. **71**.

HUILLA.—Among thickets in clayey-sandy wooded pastures near Mumpulla; end of Oct. 1859. No. **7**.

This species bears the name of *B. argenteum* var. *nervosum* Welw. et Duby. It answers closely to C. Müller's description of *B.* (*Argyrobryum*) *squarripilum*, which was gathered in St. Thomas's Island by Moller.

4. **B. cæspiticium** L. Sp. Pl. p. 1121 (1753).

LUNDA.—Gathered in the kingdom of Lunda, at a distance of about

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380 geographical miles from the west coast, by David Livingstone ; with fr. May 1855. No. **118**.

In our specimens, which much resemble this widely distributed species, the capsule and seta are blood-red in colour ; the leaves are less narrowly acuminate than in the type ; the nerve, arista and margin are yellow ; the contracted primordial utricle of the laminal cells is densely maculato-chlorophyllose.

Two other specimens, referred to this species by Duby, approach more nearly to *Bryum alpinum* in the shape of their leaves ; but in other respects they differ from it, and they are both sterile. Their numbers are as follows :—

HUILLA.—In elevated boggy wooded places by streams in Morro de Monino, common enough but sterile ; Dec. 1859 and Feb. 1860. No. **25**. On roots of old trees and on rocks by streams in rather dense woods near Catumba ; April 1860. No. **29**, in part.

5. **B. viridescens** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 218. t. ii. fig. 2 (1871).

HUILLA.—In shortly bushy pastures, flooded in summer, between Empalanca and Nene, at an elevation of 5000 to 5200 ft., but at the time of gathering (May) very scanty or cropped by cattle, etc. : with fr. in small quantity May 1860. No. **28**.

The comal leaves are elliptical, with the upper part of the margin denticulate and not convolute ; the margin near the base is narrowly revolute ; the nerve and arista are yellow ; the densely chlorophyllose contracted primordial utricle occupies the long diameter of the cells. Welwitsch notes that the capsule is viridescent or at length here and there brick-red.

6. **B. huillense** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 220. t. i. fig. 5 (1871).

Brachymenium huillense Jaeg. Gen. et Spec. Musc. i. p. 572 (1875).

HUILLA.—A cæspitose moss of Mnioid habit, with proliferous stems; rather rare on the base of old trunks in damp woods by the Monino brook, but only in the more elevated rocky stations, and never seen in fruit by Welwitsch ; April and May 1860. No. **4**.

The leaves are 4 mm. long, with margins revolute from base almost to apex ; the primordial utricle of the cells is contracted and densely chlorophyllose ; the marginal cells are long, thick-walled, yellow, but do not form a thickened limb.

The indeterminate specimens of various subgenera of *Bryum* are as follows :—

HUILLA.—A *Webera* mingled with Hepatics at an elevation of 5400 ft. in rugged parts of Morro de Monino ; April 1860. No. **30**. A few little tufts of a *Webera* found among ferns in rugged places at the spot called by the natives "Ferrão da Sola," by the cataract near Lopollo ; with poor fr. Jan. 1860. No. **44**. In congested dark green tufts forming wide patches on the ground in woody places on the way from Lake Ivantâla towards Quilengues ; sterile, Feb. 1860. No. **41**.

PUNGO ANDONGO.—On moist rocks in the more elevated parts of Barranco de S. Antonio within the præsidium ; without fr. May 1857. No. **52**. A glistening green *Rhodobryum*, widely but laxly cæspitose, common on the rich soil covering the shaded rocks of Mata de Pungo ; sterile, middle of May 1857 ; and by cataracts in the woods in Valle de Cabondo ; sterile, Dec. 1856. No. **55**. Intensely green, widely cæspitose by the spring of "Cazella" within the præsidium at

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an elevation of 3000 to 3200 ft.; sterile, Sept. 1856; but later on utterly destroyed at the cleaning of the spring soon after Welwitsch's arrival in Pungo Andongo. No. **65**. Widely cæspitose in grottoes of moist rock at the foot of Serra de Pedras de Guinga; sterile, Jan. 1857. No. **82**. Poor specimens yellowish green, densely pulvinate, on shaded ground by the great cataract of the river Cuanza near Condo; without mature fr. March 1857. No. **83**.

GOLUNGO ALTO.—A moss rarely noticed, of a pleasant very green colour, in company with other mosses, widely but laxly cæspitose in shortly grassy places on the banks of the Moio (Mûia) stream, to the right as one ascends to Quilombo-Quiacatubia; with female inflorescence 16 July 1856. No. **181**.

MOSSAMEDES.—The only species of moss observed by Welwitsch in the littoral region between 14° and 16° S. lat.; on the muddy-sandy banks of the nearly dried up river Bero or Rio das Mortes at sea level near Cavalheiros; in small quantity and without fr. June 1859. No. **1**.

18. **POGONATUM** Pal.-Beauv. Prodr. p. 39 (1805).

1. **P. angolense** Jaeg. Gen. et Spec. Musc. I. p. 713 (1875).

Polytrichum (*Pogonatum*) *angolense* Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 217 (1871). *P.* (*Pogonatum*) *huillense* Welw. et Duby, *op. cit.*, tab. i., fig. 2.

HUILLA.—A Polytrichoid moss of gregarious growth, allied in habit and characters to *P. brachyphyllum* Pal.-Beauv. and various European species; very rare, seen by Welwitsch in only one place, in elevated shortly bushy pastures in the plateau de Empalanca; with fr. April 1860. No. **18**.

19. **POLYTRICHUM** Dill.; Br., Sch. et Guemb. Bry. Eur. IV. (1836-51).

1. **P. commune** L. Sp. Pl. p. 1109 (1753).

PUNGO ANDONGO.—Common on the higher rocks of the præsidium by the cataracts of the streams near Cabondo, but apparently very seldom bearing fruit; always without fr. Dec. 1856, Jan., Feb. and April 1857. No. **49**.

HUILLA.—A very fine moss, glaucous-green, laxly and widely cæspitose, commonest of African Polytrichums; in the rather shady rocky elevated thickets of Morro de Lopollo, in company with Proteæ, Melastomaceæ and Utricularieæ; without fr. Feb. 1860. No. **16**. In rocky places, growing with *Blœria Bugonii* Engl. (Herb. Welw. No. 2559), by the road from Morro de Empalanca towards Nene; without fr. May 1860. No. **15**. In very rugged rather moist places from Morro de Lopollo towards Humpata, at an elevation of 3400 ft.; with inflorescence, end of May 1860; and at an elevation of 5500 ft., at Morro de Lopollo; with inflorescence March 1860. No. **14**. In elevated pastures, flooded during the rainy season, and chiefly occupied by Cyperaceæ, Eriocauloneæ and Xylideæ, at Empalanca and Nene; with fr. end of April 1860. No. **17**.

2. **P. elegans** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 217. t. ii. fig. 1 (1871).

PUNGO ANDONGO.—Laxly cæspitose, ½ to 1 ft. high, usually in company with and mixed with other mosses; common on rocks and in bushy places behind Mata do Pungo; without fr. from Oct. 1856 to May 1857. No. **50**.

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20. **FISSIDENS** Hedw. Fund. Musc. ii. p. 91 (1782).

1. **F. angolensis** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 225. t. iv. fig. 6 (1871).

GOLUNGO ALTO.—On clay soil close to the left bank of the Cuango stream near Sange; with fr. Dec. 1855. No. **138**. On schistose rocks, Monte de Queta; with fr. March 1856. No. **138***b*. At the spring of Capopa near Sange, growing on rocks of mica-schist; with but little fr. Dec. 1855. No. **138***c*. Among mosses (*Racopilum tomentosum*, etc.) by the banks of the Cuango stream; with fr. June 1856. No. **196**. Terras de Bumba; with ripe fr. June 1856. No. **334**.

PUNGO ANDONGO.—In tufts of *Lejeunea* on moist ground, also on rotting trunks, in Barranco de Songue; with fr. middle of May 1857. No. **113***b*.

CAZENGO.—On muddy ferrugineous soil, at an elevation of 2000 ft., in the mountains of Serra de Muxaûla by the rivulet of the same name; with old or fallen fr. Jan. 1855. No. **184**.

The *lamina vera* of the upper leaves of fruiting specimens of this species is partly marginate.

2. **F. dasyphus** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 224. t. iv. fig. 2 (1871).

GOLUNGO ALTO.—Very frequent by the sides of roads and steep mountain-sides, everywhere in wooded places throughout the district, at an elevation of 2000 to 2200 ft., Caminho de Bumba; with scanty fr. Jan. 1856. No. **137**.

3. **F. Welwitschii** Duby in Genève, Mém. Soc. Phys. XXI. i. p. 223. t. ii. fig. 5 (1871).

PUNGO ANDONGO.—A rather elegant species, found once on dead half-rotten branches of *Vellosia*, and afterwards sought in vain; on the more elevated rocks on the westward side of the præsidium; with scanty fr. end of April 1857. No. **113**.

4. **F. glaucissimus** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 223. t. iii. fig. 4 (1871).

GOLUNGO ALTO.—Not infrequent in the grottoes of Sobato de Quilombo Quiacatubia; with fr. July 1855. No. **139**. On rocks near Quilombo Quiacatubia; with fr. July 1856. No. **140**. In grottoes of schistose rocks in the primitive woods of Monte de Queta, by the banks of the river Luinha, at an elevation of about 1900 ft.; with fr. during the cold July of 1856. No. **142**. Val da Cedrela; with fr. July 1856. No. **336**. Also Alga No. **142**.

CAZENGO.—Interwoven with No. 186 (*Anacamptodon fabronioides*), Serra de Muchaula, at an elevation of 2000 ft.; three specimens, one with fr. Jan. 1855. No. **201**.

To this species belongs *Fissidens Zenkeri* Broth. MS. in Zenker et Staudt's Musc. Exsicc. No. 570, from Yaunde Station, Kamerun.

Var. *β* **minor** Welw. et Duby, *l.c.*, p. 224.

GOLUNGO ALTO.—With a few opercula and calyptras; seen by Welwitsch in but one place, on mossy rocks in company with tree-ferns (*Alsophila æthiopica* Welw.) alongside the streams of Quisucula; with fr. July 1857. No. **141**.

5. **F. longipes** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 224. t. iv. fig. 3 (1871).

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PUNGO ANDONGO.—Tufts 1 to 3 ft. in diameter, indeed covering the whole vertical face of a great rock, but lax and fragile ; at the base of the gigantic rocks of Cabonda ; with fr. middle of Jan. and middle of March 1857. No. **69**.

6. **F. Dubyanus** Jaeg. Gen. et Spec. Musc. p. 23 (1876).

F. macrophyllus Welw. et Duby in Genève, Mém. Soc. Phys. XXI. i. p. 223. t. iii. fig. 3 (1871).

GOLUNGO ALTO.—On very shaded clayey soil in road-cuttings between Bango and Bumba ; with unripe fr. Jan. 1856. No. **136**.

To the present genus belong the following numbers :—

PUNGO ANDONGO.—In company with *Octoblepharum albidum*, rather sparingly on wet rocks by rivulets in Barranco de Pedra Songue, originally with an old theca or two, now lost ; middle of May 1857. No. **68**. On spongy-wet mossy ground, sparingly interwoven with other mosses ; Barrancos de Catete ; with fr. middle of May 1857. No. **202**. Imperfect specimens of two species growing with *Hookeria angolensis* (No. 108) on moist ground shaded by *Cyathea angolensis* alongside rivulets and springs in Barranco da Pedra de S. Antonio ; middle of May 1857. No. **109**.

21. **OCTODICERAS** Brid. Musc. Recent. Suppl. III. i. p. 162 (1806).

1. **O. capense** Jaeg. et Sauerb. Gen. et Spec. Musc. II. p. 51 (1876).

Conomitrium capense C. Muell. Synops. II. p. 524 (1851).

BUMBO.—Plentiful in very cold rivulets and springs at Arreial de Caionda, and observed elsewhere throughout this region ; on the highest peaks of Serra da Xella, and gathered in a nice state of fruit in the Fonte de Caionda at an elevation of 4000 ft. ; Oct. 1859, also June 1860. No. **2**.

MOSSAMEDES.—In rivulets, Serra da Xella ; with fr. Oct. 1859. No. **335**.

Welwitsch paid much attention to this species. He considered that it differs from *O. Julianum*, which is common in Portugal, only in its somewhat more acute leaves, with nerve usually vanishing at two-thirds the leaf's length and not just below the apex, and in its rather larger capsule. The African plant has its older stems compressed, almost complanate, nigrescent. He observed the operculum of several capsules to be not conical but depresso-hemispherical, its rostrum becoming more equally cylindrical and not conical at the base ; but after examining more than twenty capsules in different stages of ripening, he was constrained to modify his view as to this variation of form or proportion, the normal operculum being formed almost or indeed exactly as in *O. Julianum*.

22. **RACOPILUM** Pal.-Beauv. Prodr. p. 36 (1805).

Rhacopilum C. Muell. et aliorum.

1. **R. tomentosum** Brid. Bry. Univ. II. p. 719 (1827).

Hypnum tomentosum Sw. Prodr. p. 141 (1788) ; Hedw. Musc. Frond. iv. p. 48. t. 19 (1791). *H. mucronatum* Pal.-Beauv. Prodr. p. 66 (1805).

GOLUNGO ALTO.—Growing in company with Hepatics on rocks by the banks of the Cuango stream, but in this situation seldom bearing fruit ; with fr. June 1856. No. **165**. On trunks of old trees by the

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Catombe rill on the Queta mountains ; with fr. middle of June 1857. No. **166.**

CAZENGO.—Among Hepatics on old trunks, Serra de Muxaûla ; with fr. June 1858. No. **199.**

2. **R. africanum** Mitt. in Journ. Linn. Soc. VII. p. 162 (1864).

PUNGO ANDONGO.—Frequent by shaded springs on the elevated rocks of Pedra Cazella ; with scanty fr. beginning of May 1857. No. **60.** At the base of old tree-trunks and on moist ground in wooded places near Catete, frequent but sterile ; Barranco de Catete ; without fr. Dec. 1856. No. **96.**

GOLUNGO ALTO.—On the bark of old trees and on rocks in the vicinity, near Quilombo-Quiacatubia ; with fr. March 1855. No. **150.**

To this genus the following numbers belong :—

GOLUNGO ALTO.—On half-dried mud on the banks of the Cuango stream (also occurring on lime-kilns), very seldom with fr. ; middle of June 1856. No. **149.** By the Cuango ; Feb. 1856. No. **212,** in part. On the bark of the tree "Musubiri" (*Myrianthus arboreus*), Queta (Zengas) ; March 1856. No. **213.**

CAZENGO.—On rocks usually inundated along the banks of the Luinha river, at an elevation of about 1800 ft. ; without fr. Jan. 1855. No. **183.**

23. **BRAUNIA** Br. et Sch. Bry. Eur. III. (1836-51).

1. **B. diaphana** Jaeg. Gen. et Spec. Musc. II. p. 88 (1876).

Neckera diaphana C. Muell. Synops. II. p. 105 (1851). *Leucodon sekistos* Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 427 (1872).

HUILLA.—On the older trunks, especially of *Tarchonanthus* and *Xeropetalum*, on the summit of Serra de Xella ; with old fr. June 1860. No. **31.** On rocks and trunks on the summits of the mountains of Mumpulla ; without fr. Oct. 1859. No. **33.**

Our specimens appear to differ from the type only by the longer seta, which is 8 to 10 mm. in length.

2. **B. arbuscula.**

Leucodon arbuscula Welw. et Duby in Genève, Mém. Soc. Phys XXI. ii. p. 427. t. i. fig. 4 (1872).

HUILLA.—Frequent on the older trunks and branches of *Tarchonanthus* and various other trees in rocky parts of the high peaks of Serra de Xella and towards Mumpulla ; at an elevation of 4000 ft. in company with *Macromitrium lycopodioides* and *Physcia leucomela* ; with fr. June 1860. No. **32.**

Our specimens of this plant approach *B. Schimperiana* Br. et Sch., but are abundantly distinct in the following characters. Leaves from an erecto-patent base recurved so as to become horizontal ; not imbricate ; apices of the older leaves hyaline ; capsules longly elliptical (not cylindric), irregularly plicate, with mouth rather contracted ; cells of the capsule brown, distinct (not yellow, inconspicuous, as in *B. Schimperiana*).

24. **CRYPHÆA** Weber, Tab. Exhib. Calyptr. Operc. (1813) ; Brid. Mant. Musc. p. 139 (1819).

1. **C. Welwitschii** Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 426. t. ii. fig. 1 (1872).

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GOLUNGO ALTO.—A rather rigid, deep green, viviparo-ramulose moss of cæspitose growth, completely enveloping virgate branches of trees near the margins of very elevated primitive woods. On *Coffea* and Diospyraceous trees in the woods of Cungulungulo, at an elevation of 2400 ft.; with fr. Feb. 1855. No. **128**; also No. **211**, in part.

25. **PILOTRICHELLA** Jaeg. et Sauerb. Gen. et Spec. Musc. II. p. 158 (1877).

1. **P. Welwitschii.**

Neckera (*Meteorium*) *Welwitschii* Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 428. t. iii. fig. 2 (1872).

GOLUNGO ALTO.—A very fine moss, pendulous on branches of various trees, of many colours, now deep green, now golden-flavescent, now almost like bright copper; never found in fruit by Welwitsch; in dense primitive woods, where *Coffea arabica* is frequent, at an elevation of 2400 ft., on the mountains of Cungulungulo; Feb. 1855. No. **145**, also No. **211**, in part.

CAZENGO.—Longly pendent from branches of trees, propagating itself abundantly, but not found in fruit, though diligently sought, by Welwitsch; in shady moist elevated places on the mountain of Muxaûlo; June 1855. No. **145**.

Both of our tickets are placed under the same number, and the specimens are mixed. These latter belong to the section *Orthostichella*, and in habit rather resemble *P. viridis* Jaeg. Gen. et Spec. II., p. 162, but the ramuline leaves are spathulate from a contracted base, obsoletely binervate, more longly acuminate, with upper margins involute and serrulate. The leaves are pentastichously arranged; and those of the primary branches are nearly twice as long as the ramuline, and bear an elongated subulate flexuose acumen about 0·6 mm. in length.

26. **PAPILLARIA** Jaeg. et Sauerb. Gen. et Spec. Musc. II. p. 167 (1877).

1. **P. vaginans.**

Neckera (*Meteorium*) *vaginans* Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 428. t. iii. fig. 1 (1872).

GOLUNGO ALTO.—Almost always mixed with other mosses, *Frullania*, etc., on trees and more rarely on rocks close by; frequent upon trunks of *Coffea arabica* in the *Coffea* forests at an elevation of 2800 to 3000 ft. on the mountains of Cungulungulo; without fr. Feb. 1855. No. **161**.

Our specimens belong to the section *Floribundaria* and resemble *Papillaria floribunda* C. Muell (in Linnæa XL. (1876) p. 267) in habit, but the leaves are squarroso-recurved, ovate acuminate from a cordate base, upper margins more markedly serrate. The cells are seriately 3- to 4-papillate.

2. **P. africana** Jaeg. et Sauerb. Gen. et Spec. Musc. II. p. 176 (1877).

Neckera africana C. Muell. Synops. ii. p. 137 (1851).

GOLUNGO ALTO.—More or less longly pendulous, on branches of indigenous *Coffea arabica* and other trees in the primitive woods on the summit of Cungulungulo mountain; without fr. Feb. 1855. No. **160**.

27. **CALYPTOTHECIUM** Mitt. in Journ. Linn. Soc. x. p. 190 (1869).

1. **C. golungense** Gepp. sp. n.

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Sterile. Secondary stems 5 to 10 cm. long, densely or laxly pinnate or divided into two or three pinnate branches, yellowish green at apex, scarcely shining, dull and lutescent with age and soon decaying; pinnæ 0·5 to 1·2 cm. long, obtuse at apex, occasionally longer and attenuate at apex; leaves 2·2 to 2·4 mm. long, 0·9 mm. wide near base, complanate, rugulose when dry, from a wider auriculato-cordate base ovate then ligulate (0·45 mm. wide), acute, shortly acuminate, either symmetrical and slightly hollowed, or concave on one side; margins flexuose especially near base, entire or obsoletely serrulate below, serrulate near apex; nerve slender reaching or surpassing the middle of the leaf; cells pellucid linear vermicular, becoming elliptic and rhomboid obscure in the auricles and lax quadrate, brown with age, at the basal angles; cell-walls firm yellow indistinctly porose.

This species is probably closely allied to *Neckera acutifolia* Brid., as described by Bescherelle in Ann. Sci. Nat. ser. 6, t. x. p. 273 (1880), and still more to *Calyptothecium subacutifolium* Broth. in Engl. Bot. Jahrb. xxiv. ii. p. 254 (1897); but appears to differ from the latter in the lighter colour of the plant and in the less hollow more auriculate leaves, and from the former in the smaller size of the plant and the dull surface and different shape of the leaves. The firm yellow cell-walls distinguish our plants from such allies as *Neckera Moritzii* C. Muell. and *Pterobryum duplicatum* Mitt., in which the cell-walls of the leaves are thicker, cartilaginous and distinctly porose.

GOLUNGO ALTO.—On old trunks and rocks in the vicinity alongside brooks in the primitive forests of Zengas do Alto Queta and Mata de Quisucula; without fr. Feb. and July 1856. No. **147**.

28. **POROTRICHUM** Doz. et Molk. Bry. Jav. ii. p. 69 (1862).

1. **P. lopidioides** C. Muell. in Dusén, Musci Africani Camerun. exsicc. No. 469 (1893). Paris, Index Bryolog. iv. p. 1015 (1898).

Hypnum (*Thamnium*) *africanum* Welw. et Dub. in Genève, Mém. Soc. Phys. XXI. ii. p. 436. t. iii. fig. 4 (1872). *Thamnium africanum* Jaeg. Gen. et Spec. Musc. II. p. 216 (1877). *Thuidium? filiforme* Welw. et Dub. in Genève, Mém. Soc. Phys. XXI. ii. p. 436. t. iii. fig. 4 (*Thuidium filiferum*), (1872).

GOLUNGO ALTO.—In a dense mass on rocks and tree-trunks by the Quarengue stream on the Queta mountains; without fr. April 1856. No. **148**. A widely cæspitose pendulous, dendrophilous moss, on trunks of trees ("Dizanha," *Treculia africana*) in the shadiest parts of the mountains of eastern Queta; without fr. middle of June 1857. No. **148***b*. In company with *Cryphæa* and other mosses on trunks and thicker branches of trees on the summit of Cungulungulo; without fr. Feb. 1855. No. **168**. Mixed with tufts of *Racopilum tomentosum* (No. 166) on bark in the woods of Alto Queta alongside the Catombe brook; without fr. and in small quantity end of June, July 1857. No. **169**. Also Alga No. **138**.

ST. THOMAS'S ISLAND.—Growing with *P. Quintasi* on bark at the foot of trunks in dense woods at an elevation of 2500 ft., at Novo Destino; without fr. Dec. 1860. No. **124**.

Our plants are sterile and mostly small and imperfect.

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2. **P. Quintasi** Broth. in Bol. Soc. Brot. viii. p. 181 (1890).

ST. THOMAS'S ISLAND.—A small quantity growing with *P. lopidioides* on bark at the foot of trunks in dense woods at an elevation of 2500 ft. at Novo Destino; without fr. Dec. 1860. No. **124**, in part.

3. **P. elongatum.**

Homalia elongata Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 429. t. ii. fig. 3 (1872).

GOLUNGO ALTO.—Living on old tree-trunks and rocks in the vicinity in the primitive woods of Quisucula near Bango; without fr. Feb. 1855. No. **146**. In company with other mosses, especially with tufts of *Racopilum*, on rather young trunks in the woods of Catombe, Serra de Alto Queta; without fr. June 1857. No. **167**. With *Thuidium gratum* on the older trunks in the elevated primitive woods of Serra de Alto Queta, at an elevation of 2200 ft.; without fr. Jan. 1856. No. **143**, in part. On dead branches near Zengas do Queta (Sange); with fr. July 1857. No. **146***b*.

Our specimens appear to belong to *Anastrephidium*, a section of *Porotrichum*.

29. **THAMNIUM** Schimp. in Br., Sch. et Guemb. Bry. Eur. V. (1851-55).

1. **T. variifolium.**

Homalia variifolia Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 429. t. iv. fig. 5 (1872).

PUNGO ANDONGO.—In company with *Lepidopilum angolense* on moist rocks by rivulets in Mata de Pungo; without fr. May 1857. No. **88**. On rocks by the Casalalé rivulet within the præsidium at an elevation of 3200 ft.; without fr. Feb. 1857. No. **89**. Also Alga No. **141**.

GOLUNGO ALTO.—Of a very fine green colour, sometimes without flagellæ, sometimes exceedingly flagelliferous; on old trunks and on the ground (humus) in the shadiest parts of the primitive woods of Mata de Quisucula at an elevation of 2400 ft.; without fr. Jan., July and Sept. 1855, Feb. 1856. No. **159**.

Our specimens are very closely allied to *Thamnium Hildebrandti* Jaeg. et Sauerb., of which *Porotrichum pterops* Rehm. (Musc. Austro-Afric. nos. 329 (*Neckera*), 621 and 621*b*) appears to be a synonym.

30. **HOOKERIA** Smith in Trans. Linn. Soc. ix. p. 275 (1808).

1. **H. huillensis** Gepp. sp. n.

Sterile. Laxly cæspitose. Plants lurid-brown below, glaucous-green above, yellowish at apex. Stems 3 cm. long, vaguely branched; branches 6 to 8 mm. long, and with the foliage 3·5 to 4 mm. wide; leaves variously curved, unaltered when dry, easily moistened; lateral leaves 2 mm. long, 0·75 mm. wide, ovato-ligulate subacute suddenly cuspidato-acuminate, with margins serrulate above the middle and limbate to the apex with a sub-lutescent biseriate limb, with nerves $\frac{3}{4}$ the length of the leaf, dorsally serrulate and prominent at their apices, with upper cells lax 0·045 mm. diam. rotundato-hexagonal and pseudo-incrassate with chlorophyll, and lower cells oblong; median leaves 1·5 by 0·6 mm. lanceolate-acuminate subentire, with nerves smooth evanescent about the middle of leaf, and cells longer.

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This species is allied perhaps to *H.* (*Euhookeria*) *Preussii* described by Brotherus in Engler's Botan. Jahrb. xx. p. 201 (1894), and is distinct from it in having wider branches, longer and more easily moistened leaves and probably larger areolation. It is a larger plant than *H. Breuteliana* Hampe, and its leaves are not half as wide as those of *H. Vallis-gratiæ* Hampe.

HUILLA.—A moss with leaves remarkably glaucous and rather fleshy in the living state; rather rarely occurring on the ground by oldish tree-trunks, in company with Utriculariæ and Xylideæ, etc., in the spongy swamps on Morro de Monino at an elevation of 5400 ft.; without fr. April 1860. No. **39**.

2. **H. angolensis** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 442. t. v. fig. 5 (1872).

Lepidopilum angolense Jaeg. Gen. et Spec. Musc. ii. p. 234 (1877).

PUNGO ANDONGO.—A very pretty terrestrial moss, occurring on the shaded sides of springs and rivulets in almost entirely rocky places at a considerable elevation; but only in the Barranco de Pedra de S. Antonio did Welwitsch gather it in a fruiting state, and that was on mossy ground shaded by *Cyathea angolensis* and rarely conspicuous; with fr. May 1857. No. **108**.

GOLUNGO ALTO.—Apparently a rare and sporadic moss, occurring among Hepatics at the foot of tree-trunks very scantily in the primitive woods of Quisucula near Bango-Aquitamba; with poor fr. June 1856. No. **193**.

3. **H. contracta** Gepp. sp. n.

Monoicous; green, dilute at apex; yellowish at base. Branches adscending, simple or laxly and irregularly pinnate, 2·5 to 7·0 cm. long, complanate, with the foliage 3·5 mm. wide; branchlets 0·6 to 1·2 cm. long, obtuse. Lateral leaves reflexo-patulous, contracted, unaltered when wet, variously flexed, asymmetrical, 2·0 mm. long by 0·6 wide, oblongo-lanceolate, acuminate; margins elimbate, more or less infolded on one side and with a small auricle at the base of the other (convex) side, strongly serrate above the middle, with the subapical serrations geminate; nerves two, short, vanishing below the middle; cells elongated (5 by 1), contracted, densely chlorophyllose, with pellucid walls. Median leaves shorter. Perichætial bracts smaller, more narrowly acuminate, less strongly serrate, with subapical serrations geminate. Seta 17 mm. long, smooth, red; theca (unique, damaged) inclined, oval?, with neck scaberulous, $\frac{2}{3}$ as long; operculum rostrate, $\frac{1}{2}$ as long.

This plant is readily distinguished from *H. angolensis* Welw. et Duby by the less crowded, less imbricate, more flexuous, more sharply acuminate leaves, the cells of which are contracted and obscured by chlorophyll. In the apical leaves only do the cells, when moistened, expand and become hexagonal and pellucid.

PUNGO ANDONGO.—On shaded ground in the forest called "Mata de Pungo"; in small quantity and almost without fr. May 1857. No. **80**.

H. angolensis and *H. contracta* present at first sight the appearance of a *Lepidopilum*, but differ from that genus by having a Hookeriaceous peristome and a long smooth seta and leaves with abbreviated apical

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cells and geminate apical teeth. They belong to that section of the genus *Hookeria* which Hampe has called *Lamprophyllum*, in Kjöbenhavn Vidensk. Meddel. 1874, 9, p. 158. Other species which belong to this section are *H. Pappeana* Hampe, *H. macropyxis* Rehm. (Musci Austro-Afric. nos. 339, 623), *H. utacamundiana* Mont., *H. secunda* Griff., *H. macropus* Doz. et Molk., *H. nitens* Hornsch., *H. Glaziovii* Hampe, *H. breviseta* Hampe, and probably *Lepidopilum devexum* Mitt.

31. **FABRONIA** Raddi in Att. d. Accad. d. Scienz. di Siena ix. p. 231 (1808).

1. **F. angolensis** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 425. t. i. fig. 3 (1872).

PUNGO ANDONGO.—A moss of a most beautiful green colour during life, but turning pale when dried. Common on the aerial roots of *Hariota parasitica* on the highest western rocks of the præsidium at an elevation of about 3800 to 4000 ft. on Pedra Cabonda, also on lichenous ground; with ripe fr., and occasionally young calyptras, towards the end of May 1857. No. **72**.

Var. **acuminata** Gepp. var. nov.

Leaves acuminate not piliform-acuminate.

PUNGO ANDONGO.—A small whitish-green moss, widely cæspitose, very rarely fruiting. Common on old palm-trunks (*Elæis guineensis*), but only in the neighbourhood of Candumba in open woods by the river Cuanza; with fr. March 1857. No. **74**.

GOLUNGO ALTO.—A small moss growing with *Octoblepharum albidum* on trunks of palms (*Elæis*) on the lower slopes of the mountains of Alta Queta; without fr. Dec. 1854. No. **197**.

32. **ANACAMPTODON** Brid. Mant. Musc. p. 136 (1819).

1. **A. fabronioides** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 426. t. i. fig. 5 (1872).

GOLUNGO ALTO.—A tender, widely cæspitose, flavescent-green moss, growing on bark and seldom producing fruit. On old trunks of *Monodora Myristica* Dun. near the rivulet of Quibolo in Queta; with fr. end of July 1856. No. **157**. On the bark of trees (*Monodora Myristica*) in the dense woods of Capopa; with fr. Feb. 1856. No. **157***b*. On the ground in the coffee-yielding woods of Cungulungulo, but seldom met with; without fr. Feb. 1855. No. **190**.

CAZENGO.—A small creeping moss of Fabronioid habit, but with double peristome. On trunks beside the river Muxaûla on the Serra de Muxaûla; a few specimens with old fr. Jan. 1855. No. **186**.

33. **THUIDIUM** Schimp. in Br., Sch. et Guemb. Bry. Eur. V. (1851-55).

1. **T. varians** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 440. t. v. fig. 3 (1872).

PUNGO ANDONGO.—Growing in company with *Madotheca*, *Plagiochila* and other Hepatics on the ground and on trunks, Barrancos de Catete; with fr. beginning of Dec. 1856. No. **101**. A cæspitose moss occurring but sparingly on the bark of old trees of "Mucuço" (*Gigalobium abyssinicum*) in the more elevated parts of Pedra de Cazella within the præsidium; with but scanty fr. beginning of May 1857. No. **102**. A yellowish green, very widely cæspitose moss, growing on the ground

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in Barranco do Pungo ; with immature fr. May 1857. No. **103**. Laxly cæspitose, growing on the shaded wet rocks of Barranco de S. Antonio ; with capsules very few, young and complete with opercula ; May 1857. No. **103***b*. A meagre moss with longly excurrent branches, mixed with other mosses (especially *Stereophyllum andongense* No. 95) at the foot of old trunks near Condo, not far from the great cataract of the river Cuanza ; with a solitary fr. March 1857. No. **104**.

GOLUNGO ALTO.—A cæspitose moss, common on the rocks of the Capopa rivulet, but seldom producing fr. ; with fr. Dec. 1855. Also Cascata de Capopa ; with young fr. May 1856. No. **173**. Terrestrial, Zengas do Queta ; with fr. and young flowers 9 Nov. 1855. No. **173***b*. On muddy ground on the banks of rivulets ; with fr. July 1857. No. **173***c*. On the hill-slopes of Sobato de Quilombo towards the river Zenza ; with fr. Feb. 1855. No. **209**.

The inner perichætial leaves of all the above specimens bear a few long articulated ciliary filaments on each margin above the middle.

2. **T. angolense** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 441. t. v. fig. 4 (1872).

HUILLA.—On the bark of living trees in the forests of Monino, but rather rare ; with scanty fr. beginning of Dec. 1859. No. **23**. Rather rare (so at least it appeared to Welwitsch, who was pressed for time when he traversed the locality) at the foot of old trunks and upon almost lifeless trunks in the more open forests near the great lake of Ivantâla ; with scanty fr. end of Feb. 1860. No. **46**.

3. **T. involvens** Mitt. in Journ. Linn. Soc. xii. p. 575 (1869).
Leskea involvens Hedw. Musc. Frond. iv. p. 27. t. xi. (1797).

GOLUNGO ALTO.—A dull-green creeping moss, bearing capsules and calyptras and occurring abundantly on trees of *Pacouria* by the banks of the river Coango ; with fr. June 1856. No. **174**.

Duby discusses this plant in a note under *T. tenuissimum* Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 442 (1872). Our specimens have only very young fruit.

4. **T. tenuissimum** Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 442. t. v. fig. 2 (1872).

PUNGO ANDONGO.—On moist ground by the side of rivulets in Barranco grande de Catete ; with fr. middle of May 1857. No. **51**.

GOLUNGO ALTO.—On the banks of the Cuango river ; without fr. Feb. 1856. No. **204**.

This species is perhaps identical with *T. perbyssaceum* C. Muell. ex Broth. in Engl. Bot. Jahrb. XXIV. ii. p. 283 (1897). The difference of the latter lies in the inclination of the theca and in the number of its cilia, as described.

5. **T. gratum** Jaeg. et Sauerb. Gen. et Sp. Musc. ii. p. 322 (1878).
Hypnum gratum Pal.-Beauv. Prodrome, p. 64 (1805).

GOLUNGO ALTO.—On the older trunks in the elevated primitive woods of Serra de Alta Queta, at an elevation of 2200 ft. above sea level ; with fr. Jan. 1856. No. **143**. On shaded rocks by the side of the Capopa river ; very seldom producing fr. ; with fr. beginning of Jan. 1856. No. **151**. On the spiny trunks of Pacobolo (*Zanthoxylum macrophyllum* Oliv., Herb. Welw. No. 4568) in Mata Quisucula, sparingly and with fr. scarcely mature ; Feb. 1855. No. **162**. On the wet rocks of Capopa ; without fr. Sept. 1855. No. **162***b*.

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34. **ERYTHRODONTIUM** Hampe in Kjöbnh. Vidensk. Meddel. (1870), p. 279.

1. **E. subjulaceum** Paris Index Bryolog. p. 437 (1895).

Pterigynandrum subjulaceum C. Muell. in Linnæa xxxix. p. 453 (1875).

Var. **impolitum** Gepp. var. nov.

Ramuline leaves not shining, in the dry state less closely appressed than in the type, plicate under pressure, more widely acuminulate.

PUNGO ANDONGO.—A yellowish green, creeping, widely cæspitose moss, found on rotting old trunks in Barrancos de Catete, and more rarely on the bare ground in the same place; with operculate fr. and very fugacious calyptras, May 1857. No. **84**.

GOLUNGO ALTO.—On trunks and branches of *Edwardia lurida* in the forests of Quilombo-Quiacatubia, at an elevation of 2400 ft.; with old fr. end of Feb. 1855. No. **164**. Growing with *Macromitrium lycopodioides* on old trunks, especially on *Edwardia*, in the rocky woody parts of Sobato de Quilombo-Quiacatubia; July 1856. No. **144**. Welwitsch says he also gathered the plant at Alto Queta.

2. **E. bicolor** Gepp sp. n.

Plant closely and widely interwoven. Stem creeping, rooting, pinnately branched, with leaves homomallous. Branches numerous, ascending, curved, brunnescent below, flavescent above, terete-julaceous, scarcely polished, obtuse, 3 to 5 mm. long, 0·4 mm. wide when dry, 1·0 wide when wet. Ramuline leaves appressed when dry, erecto-patent when wet, 0·85 mm. long by 0·375 mm. wide, from a broad cordate base elliptic-ovate acuminate, slightly hollowed, shortly binervate, with margins erect or slightly recurved, minutely serrulate above middle; alar cells quadrate numerous, ascending to $\frac{1}{3}$ length of margin, 0·01 to 0·015 mm. diam., with primordial utricle contracted, dense; upper cells vermiform-elongate (0·05 by 0·006 mm.), smooth, with walls lutescent.

HUILLA.—A densely and widely cæspitose moss, covering the older tree-trunks on the northern and western sides; on nearly lifeless bark in the elevated woods of Monino near Lopollo; without fr. Apr. 1860. No. **8**.

This sterile specimen appears to belong to the present genus. In habit and in leaf-structure it is related to *E. subjulaceum* Paris, but differs in the shape of the leaves which are oblong-ovate, half as wide, much less excavate. The leaves approach in shape more nearly to those of *E. Schweinfurthi* Paris (Index Bryolog. p. 437), but are much less excavate and have much less visibly reflexed margins.

35. **TRACHYPHYLLUM** Gepp gen. nov.

A genus of the family *Entodonteæ*, nearest to *Erythrodontium* and differing in the papillate dorsal surface of the leaves and in the inclined, lopsided theca. It is distinguished from *Pterigynandrum* by the very numerous alar cells of its leaves.

Stem prostrate, more or less pinnate; branches ascending, julaceous; leaves appressed (apex patent) when dry, very patent

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when wet, cordate-ovate acuminate, rather concave, shortly bicostate; margins erect; back papillate; alar cells multi-seriate, small, quadrate to rhomboid-oblate, reaching to the base of the nerves and to or beyond the middle of the margin, obscured by the contracted, chlorophyllose, primordial utricle; upper cells linear-elliptic with apices projecting from the back of the leaf. Perichætium longly exserted; seta elongate; theca inclined, unequal; operculum brevirostrate. Peristome (in *T. gastrodes*) teeth with a median furrow outside, and with lamellate trabeculæ inside; processes plicate and cilia solitary, subequal to them (Duby). Calyptra unknown.

1. **T. gastrodes** Gepp.

Hypnum (*Heterocladium*) *gastrodes* Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 439. t. v. fig. 1 (1872). *Heterocladium gastrodes* Jaeg. et Sauerb. Gen. et Spec. Musc ii. p. 311 (1878).

HUILLA.—On rocks and old tree-trunks in the elevated rocky parts of Serra da Xella, where the *Tarchonanthus* woods begin, bearing very scanty fruit, most of the thecas having already fallen off; however, specimens with a few entire capsules were found June 1860. No. 22. Mixed with No. 32 (*Braunia arbuscula*) but apparently of rather rare occurrence; on *Tarchonanthus* in rocky woods at the summit of Serra da Xella; without fr. June 1860. No. 189.

This genus is designed for the reception of a few vagrant species which, though mostly unknown in the fruiting state, have in common a well-marked vegetative habit in the expansive movement of the leaves upon the application of water, and in the areolation of the leaves and their papillate dorsal surface. In the leaf-structure an approach to *Erythrodontium* is indicated, but the inclined, camptocarpous fruit is not found in that genus.

The other species refered to the genus are:—

2. T. INFLEXUM, from Nepal (Wallich).

Hypnum inflexum Harv. in Hook. Icon. Pl. Rar. I. t. xxiv. fig. 6 (1836); and in Hook. Journ. of Botany ii. p. 20 (1840). *Stereodon inflexus* Mitt. in Journ. Linn. Soc. Suppl. i. p. 92 (1859). *Pterigynandrum inflexum* C. Muell. in Linnæa xxxix. p. 455 (1875). *Entodon inflexus* C. Muell. in *op. cit.*, xlii. p. 435 (1878-9). *Platygyrium inflexum* Jaeg. et Sauerb. Gen. et Spec. Musc. ii. p. 342 (1878).

The fruit of this species appears to be Stereodontaceous like that of the foregoing species.

3. T. FERRICOLUM, from Central Africa (Schweinfurth).

Pterigynandrum ferricolum C. Muell. in Linnæa xxxix. p. 454 (1875). *Platygyrium brevicollum* Jaeg. et Sauerb. Gen. et Spec. Musc. ii. p. 343 (1878). *Platygyrium ferricolum* eorund., *op. cit.* p. 742 (1879).

4. T. FABRONIOIDES, from Mauritius (De Robillard).

Pterigynandrum fabronioides C. Muell. ex Besch. in Ann. Sci. Nat. sér. 6. x. p. 292 (1880). *Leptohymenium fabronioides* Besch. in *loc. cit.*

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5. T. FERRIEZII from Mayotte (Marie).

Leptohymenium Ferriezii Marie apud Besch. in Ann. Sci. Nat. sér. 7. ii. p. 95 (1885).

6. T. CURVIFOLIUM from Rodriguez (Balfour).

Pterogonium curvifolium Mitt. in Phil. Trans. Roy. Soc. 168, p. 392, t. 37, fig. *c.* (1879).

Possibly *Pylaisia Dusenii* C.M., described by Broth. in Engl. Bot. Jahrb. xxiv. 2, p. 261 (1897), from Kamerun (Dusen, n. 810), also belongs to this genus.

36. **RHYNCHOSTEGIUM** Schimp. in Br. Sch. et Guemb. Bry. Eur. v. (1851-55).

1. **R. Hopfferi.**

Hypnum (*Brachythecium*) *Hopfferi* Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 431. t. ii. fig. 2 (1872). *Brachythecium Popfferi* Jaeg. et Sauerb. Gen. et Spec. Musc. ii. p. 392 (1878).

ST. THOMAS'S ISLAND.—A beautiful species, named after the distinguished Dr. Frid. Hopffer, Medical Officer of Health in the Cape de Verde Islands. Welwitsch proceeds to describe this moss as cæspitose, with a Hypnoid habit, or rather with the habit of a *Hookeria* ; with stems prostrate rooting, and leaves distichous bright green. Plant of a bright and varying green colour ; leaves from a wide amplexicaul base ovate-lanceolate, gradually acuminate, nerveless, densely areolate with narrow elongate cells ; margin serrulate. Rather rare, growing with Hepatics on old trunks in the dense primitive forests of Novo Destino, at an elevation of about 2500 ft.; with fr. Dec. 1860. No. **125.**

This species is closely related to *R. megapelma* C. Muell. in Dusén, Musci Africani Camerun. exsicc. No. 221, which is described under *Hypnum* (*Rhynchostegium*) *megapelma* by Brotherus in Engl. Bot. Jahrb. xx. p. 212 (1894). But Welwitsch's plant is distinct in its lighter brighter colour, its less crowded leaves, more chlorophyllose leaf-cells, and stouter untwisted seta.

2. **R. luteo-nitens** Jaeg. et Sauerb. Gen. et Spec. Musc. ii. p. 434 (1878).

Hypnum (*Rhynchostegium ?*) *luteo-nitens* Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 435. t. iv. fig. 1 (1872).

GOLUNGO ALTO.—Growing in company with *Racopilum tomentosum*, Hepatics and *Adiantum Capillus Veneris*, and covering with wide patches of intense green the rocks by the great cataract of the Cuango stream, but very rarely producing fruit; sparingly with fruit and opercula Aug. 1855 ; but when Welwitsch returned in the ensuing December to collect this moss in good fruiting state, he found its whole splendour destroyed by the superabundance of the water of the fall, the plants being partly submerged. No. **178.** Closely mingled with *Ectropothecium golungense* on moist shaded rocks in primitive woods above Undelle at the spot called " O Quibolo " ; without fr. July 1856. No. **154,** in part. With the same moss on the ground and on shaded sandy rocks around the Fonte de Capopa near Sange ; without fr. March 1856. No. **180** in part. With the same moss on iron-sandstone rocks in shaded spots between Undelle and the Capopa stream ; without fr. April 1859. No. **187** in part. With a species of *Raphidostegium* on bark, Zengas do Queta ; without fr. No. **217.** Cascate de Congo and de Cuanza, with scarcely any fr. Feb. 1856, March 1857. With No. **178**

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in the British Museum set. In company with *Fissidens glaucissimus* (No. 142) in grottoes by the river Luinha; sterile July 1856. No. **203.**

3. **R. oxyodon**

Hypnum (*Ectropothecium*) *oxyodon* Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 432. t. iii. fig. 7 (1872). *Ectropothecium oxyodon* Jaeg. et Sauerb. Gen. et Spec. Musc. ii. p. 537 (1879).

CAZENGO.—Leaves singly nerved, serrate. On a trunk ejected by a rushing rivulet at an elevation of 2000 ft. on Serra de Muchaûla; a few specimens with old fr. Jan. 1855. No. **185.**

GOLUNGO ALTO.—Leaves ovate, shortly acuminate, singly nerved, with margin acutely serrate; not sent to Duby. Found sparingly in company with *Marchantia* at Fonte de Capopa, near Canguerasange; without fr. 1 Dec. 1854. No. **195.** On the rocks of the Cassaballa rivulet in Sobato de Bumba; without fr. Dec. 1855. No. **216.** Also seen by Welwitsch in the Quisucula, Aug. 1857.

37. **RAPHIDOSTEGIUM** De Not. Epilogo d. Briol. Ital. pp. 17, 182. *Rhaphidostegium*, op. cit., p. 777 (1869).

1. **R. variegatum.**

Hypnum variegatum Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 436. t. iv. fig. 4 (1872). *? Taxithelium variegatum* Jaeg. et. Sauerb. Gen. et Spec. Musc. ii. p. 489 (1878).

HUILLA.—A widely cæspitose, flavescent-green moss; fruit-stalks fusco-coccineous erect; capsules inclined; calyptras elongate-cylindrical, smooth, yellow, dropping off long before maturity. Common, but rather rarely fruiting, at the foot of trees on the bushy swampy plain near Humpata and Empalanca, at an elevation of 5100 to 5300 ft.; with fr. Feb. 1860. No. **34.** On the ground among bushes by the cataract of Ferrão da Sola in the elevated plain of Lopollo; without fr. Feb. 1860. No. **21.** Intermixed with *Isopterygium* at the foot of trees between Lopollo and Lake Ivantâla; Feb. 1860. No. **45** in part.

2. **R. concolor** Gepp, sp. n.

Dioicous. Plant slender, cæspitose, in tufts 7 cm. wide, flavescent-green, shining. Stem creeping, with scattered rootlets, pinnately branched. Branches numerous, suberect, mostly simple, 8 mm. long, homomallophyllous, 1·25 mm. wide with the leaves. Leaves sub-orthostichous, imbricate, erecto-patent, from a contracted base ovate, suddenly longly and narrowly acuminate, excavate, with margins more or less revolute, serrulate above middle, subserrate towards apex, with two short nerves; cells elongate narrowly sinuato-elliptic, very dilutely chlorophyllose, with pellucid hyaline cell-walls; lowest basal cells concolorous; alar cells 3 or 4, very lax, hyaline, very thin-walled; supra-alar few, lax, hyaline. Perichætial bracts 8, erect; outer 0·6 to 0·8 mm. long, lanceolate acuminate; innermost 2·5 mm. long, elliptic lanceolate, suddenly very longly and narrowly attenuate, remotely serrate towards apex, with cells larger and firmer. Seta 15 mm. long, very slender, pale reddish, smooth, bent at apex. Theca inclined or horizontal, longly ellipsoidal, with a short neck, fuscous. Peristome as in *R. variegatum*. Operculum convex, shortly and bluntly rostrate.

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HUILLA.—A widely cæspitose moss, of a brilliant green colour, or sometimes of a shining flavescent green. Common, but seldom bearing fruit, on the ground or at the foot of old trees in forests between Lopollo and the Monino river; with fr. end of Dec. 1859. No. **36.**

This species is very closely related to *R. variegatum* in the shape of the leaves and the peristome; but appears to be sufficiently distinct in the glistening uniformly green colour, pinnate ramification, longer branchlets, more erect leaves with more delicate less distinct cells, and longer capsule. In *R. variegatum* the nerves and cell-walls of the leaves are lutescent, and the cell contents are contracted into a thin sinuate more or less evanescent thread.

3. **R. physaophyllos.**

Hypnum (*Isothecium*) *physaophyllos* Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 434. t. iv. fig. 2 (1872). *Isothecium physaphyllos* Jaeg. et Sauerb. Gen. et Spec. Musc. ii. p. 366 (1878).

PUNGO ANDONGO.—A deep green, densely cæspitose moss; on damp ground and at the foot of old tree-trunks in forests between Mutollo and Candumba, but very rarely bearing fruit; with fr. beginning of March 1857. No. **100.**

This species is less robust than *R. chrysotis* Broth. [Engl. Bot. Jahrb. XXIV. ii. p. 275 (1897)], and is of a brighter and more uniform green colour; but in that species it appears to find its nearest ally. In the theca there is a close resemblance, but Duby found no cilia in the peristome. The leaves of Welwitsch's plant are more crowded, less spreading, shorter, longly acuminate, with margins usually recurved, with two very short nerves, and alar cells four instead of six, and not forming an auricle. The branches are obtuse, not pungent, at apex.

With the above species should be compared the following:—

GOLUNGO ALTO.—On bark with *Rhynchostegium luteo-nitens*, Zengas do Queta; without fr. No. **217**, in part.

To the present genus are to be referred the following numbers in the British Museum:—

PUNGO ANDONGO.—A creeping moss with ascending branches. Apparently rather rare on dead branches of *Vellosiæ*, on the more elevated rocks within the præsidium; with scanty fr. end of April 1857. No. **73.**

GOLUNGO ALTO.—In company with No. **170** (*Stereophyllum linguæfolium*) and with some Hepatics on the bark of trees growing in the shady forests of Serra de Alto Queta; with fr. July 1856. Amongst Hepatics, Queta Central; with fr. July 1856. Alto Queta Central; with fr. July 1856; in company with No. 167 (*Porotrichum elongatum*) on rather stout living trunks in dense primitive woods near Trombeta; with fr. Aug. 1857. No. **171.**

38. **TRICHOSTELEUM** Mitt. in Journ. Linn. Soc. x. p. 181 (1869).

1. **T. truncatum.**

Homalia truncata Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 430. t. iii. fig. 5 (1872).

PUNGO ANDONGO.—A widely cæspitose, glaucous-green moss, occurring sparsely in rocky shady places at Luxillo, but bearing very scanty fruit; with fr. May 1857. No. **105.** Creeping on the bare roots of small ferns (*Asplenium*) by the banks of rivulets in Barranco de S. Antonio within the præsidium; without fr. May 1857. No. **114.**

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This species, which bears a misleading resemblance to the *Hylotapis* section of the genus *Hookeria*, is nearly allied to *T. truncatulum* Jaeg. et Sauerb. gathered in Peru by Pöppig; also to *Taxithelium perplanicaule* Broth. from the Cameroons (Dusén, No. 704), but in that plant the leaves are not papillate.

39. **TAXITHELIUM** Spruce Catal. Musc. p. 14 (1867); Spruce ex Mitt. in Journ. Linn. Soc. xii. p. 496 (1869).

1. **T. stenosekos.**

Hypnum stenosekos Welw. et Dub. in Genève, Mém. Soc. Phys. XXI. ii. p. 438. t. i. fig. 2 (1872). *Isopterygium stenosekos* Jaeg. et Sauerb. Gen. et Spec. Musc. ii. p. 503 (1878).

PUNGO ANDONGO.—On old tree-trunks near the great cataract of the Cuanza river at Condo and Mata de Quisonde; specimens with opercula and with young calyptras gathered in the same place; with fr. March 1857. No. **98**.

The foliage of this species is compressed as in *T. compressicaule* Broth. from the Cameroons (Dusén, No. 758), but the leaves of Welwitsch's plant are shorter, more obtuse, with the alar cells larger and colourless, and the upper cells seriately papillate.

2. **T. andongense** Gepp, sp. n.

Widely cæspitose, lutescent-green, dull; branches elongate, creeping, straggling, here and there attached by rootlets, pinnately branched; branchlets up to 2 cm. long, patulous, flexuose, compressed, laxly foliose, obtuse; ramuline leaves laxly imbricate, patent, concave, from a constricted base oblong or ovate-oblong, very shortly acuminate or obtuse and terminated by short apiculus; margins erect, at apex minutely denticulate; nerves wanting; cells elongate, very narrow, smooth or bearing a single median dorsal papilla (more rarely two seriate papillæ); alar cells 3 to 5, vesicular, hyaline; supra-alar few, hyaline, quadrate. Inflorescence, fruit, etc., wanting.

PUNGO ANDONGO.—In the shaded woody parts of Barranco de Pedra de San Antonio; sterile, May 1857. No. **112**.

This species differs from the preceding in being of a deeper green colour and of a straggling and more irregular habit, but especially in the scarcity of papillæ on the leaf-cells. It is quite distinct from *T. compressicaule* Broth. (Cameroons, Dusén, No. 758) in habit, and from *T. rotundatulum* Broth. (Cameroons, Dusén, No. 703) in habit, leaf-shape and papillæ.

40. **ISOPTERYGIUM** Mitt. in Journ. Linn. Soc. xii. p. 497 (1869).

1. **I. Welwitschii** Gepp, sp. n.

Autoicous. Plant densely and widely cæspitose, depressed, slender, flavescent green, glistening; stem longly creeping, pinnately branched; branches 15 mm. long, compressed, with rather dense foliage; branchlets pinnately arranged, 3 to 5 mm. long, compressed, acute; leaves complanate, laxly imbricate, rather concave, from a contracted base obliquely ovato-lanceolate acuminate, rather rugulose, with margins more or less revolute, serrulate minutely above and very minutely below; nerves two,

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very short or obsolete; cells elongate, very narrow, with firm flavid walls, basilar cells lax, alar two upon two subquadrate, lax; perichætial bracts erect, lanceolate, longly acuminate, serrulate; seta 15 mm. high; theca subhorizontal, ovoid, with a short rugulose neck; endostome processes subperforate, cilia one or two interspersed; operculum obliquely conic, shortly rostrate.

HUILLA.—Terrestrial or on the base of old trunks in the forests of *Leguminosæ*, called "Matas de Panda" *i.e. Brachystegia* and *Berlinia*, between Lopollo and Lake Ivantâla, collected during the flight; with fr. end of Feb. 1860. No. **45**.

This species resembles *I. Antunesii* Broth. in Engl. Bot. Jahrb. XXIV. ii. p. 264 (1897), gathered in Huilla, in the imbricated arrangement of its leaves, but is a smaller and much more slender plant with a short-necked theca.

2. **I. Dubyi** Gepp, sp. n.

Antoicous. Plant rather robust, widely and laxly cæspitose, flavescent-green, depressed. Stem 5 to 6 cm. long, creeping, laxly pinnately branched, with homomallous leaves; branches 7 to 13 mm. long, usually simple, very compressed, with rather dense foliage, diameter with the leaves 2·5 mm., obtuse. Rameal leaves very complanate, widely divergent, rather hollow, obliquely ovato-lanceolate, shortly acuminate, with margins a little recurved, quite entire or at the apex very minutely serrulate or denticulate; nerves two very slender, $\frac{1}{4}$ the length of the leaf; cells elongate (10 by 0·75 μ.), basilar lax; perichætial bracts erect, lanceolate, longly acuminate, minutely serrulate above, lower cells lax, basal cells brown; seta 14 to 15 mm. high, yellowish-red; theca horizontal, oval, subincurved, with mouth oblique, neck short rugulose; processes of endostome subperforate, cilia solitary; operculum convex, shortly rostrate.

PUNGO ANDONGO.—A very pretty and not uncommon moss, yellow-green, or bright-gold in drier situations, widely cæspitose on stones and moist earth by rivulets and springs in the woody parts of Barrancos de Mata de Pungo; with fr. beginning of May 1857. No. **97**.

This species bears some resemblance to *Hypnum leucophanes* Hampe (*Plagiothecium* C. Muell.; *Isopterygium* Jaeg. et Sauerb.) in its foliage but has wider leaf-cells.

Allied to the preceding species are the following numbers:—

PUNGO ANDONGO.—In company with *Campylopus horridus* (Welw. No. 76), Barranco de Pedra Songue; with fr. April 1857. No. **77**. Within the præsidium on shady ground near Caghuy, with unripe fr.; and on moist ground in rocky places near Caghuy, not far from the præsidium, sterile; March 1857. No. **110**. A yellow-green moss with bright-purple fruit-stalks, common, but seldom fertile, on the most deeply shaded ground in the primitive woods of the island "Calemba" in the river Cuanza not far from Quisonde; with fr. March 1857. No. **111**. A widely cæspitose, humble, creeping moss, on the ground in marshy woody places near Luxillo; sterile, Feb. 1857. No **120**; also No. **205**, in part.

BUMBO.—Mixed with Hepatics, attached to rocks in primitive forests near Chão da Xella on the ascent of Serra da Xella; without fr. June 1860. No. **43**.

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41. **ECTROPOTHECIUM** Mitt. in Journ. Linn. Soc. x. p. 180 (1869).

1. **E. capillisetum** Kindb. Enum. Bryin. Exot. p. 98 (1891).

Hypnum (*Cupressina*) *capillisetum* C. Muell. in Flora 69. p. 521 (1886).

GOLUNGO ALTO.—On shaded rocks in woods of *Raphia textilis* by the Delamboa river, with a few old and young capsules and calyptras; July 1856. No. **177**.

The type of this species was gathered by H. Soyaux in Pungo Andongo on moist rocks by the river Engamzambe; 30 March 1875.

Possibly the following sterile and imperfect specimens also belong to this species:—

GOLUNGO ALTO.—A brilliant flavescent-green plant, widely cæspitose on the banks of rivulets in dense woods; Mata de Quisucula; Jan. 1856. No. **172**.

PUNGO ANDONGO.—On the exposed roots of old trunks in woods near Luxillo, apparently rather rare; May 1857. No. **99**.

2. **E. strephomischos.**

Hypnum (*Leucomium*) *strephomischos* Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 434. t. i. fig. 6 (1872). *Leucomium strephomischos* Jaeg. et Sauerb., Gen. et Spec. Musc. ii. p. 539 (1879).

GOLUNGO ALTO.—Flavous-green, rather shining, widely and densely cæspitose, but apparently very rarely bearing fruit, [the British Museum specimens are well supplied with fruit]; on the withering fronds of rather large ferns (*Platycerium angolense* Welw.) in the forests of Quibanga; with fr. July 1856. No. **179**. In the same place; not however on *Platycerium* itself, but at the foot of the same tree: on ground by the tree on which was growing *Platycerium*, the matrix of No. 179, in the forests of Quibanga; with fr. July 1856. No. **179*b***.

In size and general appearance this species approaches exceedingly closely to *Vesicularia bryocarpa* C. Muell. in Dusén's mosses from the Cameroons (No. 311), but differs in having a pendulous (not inclined) theca and in not fruiting copiously. To *E. contractile* Broth. from the Cameroons (Preuss, No. 1026) it is also nearly allied, especially in the texture of the leaves. The leaf-cells contract and become indistinct when dry, and expand very slowly in water. The leaves of Welwitsch's plant are much more longly and gradually acuminate, and the stems are not nearly so long as in *E. contractile*.

The following specimen, the fruit of which was already destroyed when Welwitsch collected the plant, is allied to the above species and also to *E. glauculum*, described by Brotherus in Bol. Soc. Brot. viii. p. 186 (1890), and collected in the same island by Quintas:—

ISLAND OF ST. THOMAS.—Cæspitose on moist rocks and on half-rotten trunks in the vicinity, in the woods of Novo Destino, at an elevation of 2500 ft.; without fr. Dec. 1860. No. **123**.

3. **E. golungense** Jaeg. et Sauerb. Gen. et Spec. Musc. ii. p. 538.

Hypnum (*Ectropothecium*) *golungense* Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 432. t. ii. fig. 4 (1872).

GOLUNGO ALTO.—A very fine moss hanging down at some length from rocks which are constantly wet, but never noticed to be bearing fruit; at the cataract of the Quibôlo spring; without fr. March 1856.

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No. **152**. Yellowish green, cæspitose and emitting runners; on wet rocks by the rivulet Quiapôze near Caminho para Mussengue; with fr. middle of June 1857. No. **153**. A single specimen gathered on rocks inundated by the rivulet of Capope in a mountain-wood near Sange; with scanty fr. Dec. 1854. No. **153***b*. On wet shaded rocks by a cataract in primitive woods above Undelle, at the place called "O Quibôlo;" common but not bearing much fruit, however in the larger tufts young calyptras were present in July 1856. No. **154**. On wet muddy ground by the river Cuango; with fr. June 1856. No. **158**. In company with *Marchantiæ* and other Hepatics in shaded places by the Capopa spring; with scant fr. but good and operculate, Sept. 1856. No. **175**. Very widely cæspitose, intensely green, growing on the wet banks of rivulets; on rocks by the rivulet of Quibôlo near Sange; with fr. middle of June 1857. No. **176**. Widely cæspitose, mixed with *Rhynchostegium luteonitens*, on the ground and on sandy rocks in shaded rocky places, Fonte de Capopa near Sange; with fr. March 1856. No. **180**. On rocks by the Moio river on the ascent to Quilombo Quiacatubia; with fr. Jan. 1855. No. **180***b*. With *Rhynchostegium luteonitens* etc. on mossy rocks of iron-sandstone in shaded places, at an elevation of 2500 ft., between Undelle and the Capopa river; with scanty fr. April 1856. No. **187**. With a small species of *Fissidens* on the ground in woods, Quilombo Quiacatubia; with fr. July 1856. No. **214**. With the same species of *Rhynchostegium*, widely cæspitose, on rotting trunks in Barranco de Capopa; 19 Aug. 1857. No. **215**.

This species belongs to the subgenus *Vesicularia*, and its type-specimens appear to be Nos. 154, 175, 176, 180. In the absence of one distinct and definite type with which the numerous other specimens may be compared, such minor differences as are observable in some of the latter lose their value.

4. **E. chlorizans.**

Hypnum chlorizans Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 437. t. iv. fig. 6 (1872). *Microthamnium chlorizans* Jaeg. et Sauerb. ii. p. 491 (1878).

GOLUNGO ALTO.—Widely cæspitose on the banks of rivulets in well lighted primitive woods, Sobato de Bumba; with old fr. end of May 1855. No. **163**. Also Quisucula. With Alga No. **178**.

A remarkable species agreeing with the subgenus *Vesicularia* in its habit, in the complanate arrangement of its diversiform leaves, but distinct in the Porotrichoid areolation of the leaves. The leaves are of two sorts; those of the upper side are distichous, patulous, imbricate, complanate, 1·0 mm. long by 0·45 mm. wide, from a narrowed base, obliquely ovate (rotundate on one side, infolded on the other side), acute shortly acuminate, faintly bicostate, with margins irregularly denticulate above middle and here and there revolute; cells pachydermatous, upper oval-hexagonal (0·012 by 0·006 mm.), lower longly elliptic-hexagonal (0·025 by 0·005 mm.), alar impressed and difficult to distinguish but apparently three or four fugacious inflated hyaline cells with a few sub-obscure quadrate cells superposed Leaves of the under side variable in size (0·6 to 1·0 mm. long by 0·25 to 0·3 mm. wide) patent from a sub-oblique ovate base lanceolate longly acuminate, with margins more or less recurved, cells all elongately elliptic (0·03 by 0·005 mm.) sinuous with cell-walls 0·005 mm. thick. The apex of the seta is curved and thickened (plicate when dry) forming a neck joined obliquely to the theca. Theca usually horizontal, oval and asymmetrical, becoming subcylindric with age, a little contracted below the

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large and oblique mouth when dry; operculum Brachythecioid-conic 0·5 mm. long; sporangium with operculum 1·2 mm. long.

42. **LEUCOMIUM** Mitt. in Journ. Linn. Soc. x. p. 180 (1869).

1. **L. golungense** Gepp, sp. n.

Monoicous. Plants laxly cæspitose, pale green, not glistening; stem creeping, sparingly and irregularly pinnately branched; branchlets 5 to 10 mm. long by 4 to 5 mm. wide (with leaves), complanate, obtuse, with rather lax foliage; lateral leaves patulous, rather curved, lanceolate, median leaves elliptic, all rather hollow piliform-acuminate, nerveless, quite entire; cells lax, rhomboidal; perichætial bracts much smaller, the innermost being truncate, erose, suddenly longly apiculate; seta 10 mm. long, red, towards its apex curved and slightly scaberulous; theca inclined or horizontal, oval, occasionally substrumous, more or less constricted below the mouth when dry.

GOLUNGO ALTO.—Subglaucescent (when gathered), very laxly cæspitulose on rocks and trees alongside the Catombe rivulet in the mountains of Alto Queta, but in small quantity; with fr. middle of June 1857. No. **191**. A moss of an intense and bright glaucous-green colour, covering exposed muddy spots by rivulets in the primitive forests of Quisuncula, in company with *Begonia;* with fr. June 1856. No. **192**. On rocks in the forests of Queta-Zengas, growing with *Sprucella succida* (No. 219); gathered with fr. (now lost), no date. No. **191***b*. An elegant moss of a pleasant green colour, clothing with its wide tufts the rocks by the spring of Capopa; Oct. 1854. No. **194**.

This species appears to be distinct from the Cameroons plant *L. perglaucum* Broth., described in Engler's Botan. Jahrb. Band. xxiv. p. 273 (1897), in several particulars, such as the foliage, the shape of the leaves, and the theca.

43. **STEREOPHYLLUM** Mitt. in Journ. Linn. Soc. Suppl. i. p. 117 (1859).

1. **S. omalosekos** Jaeg. et Sauerb. Gen. et Spec. Musc. ii. p. 544 (1879).

Hypnum (*Stereophyllum*) *omalosekos* Welw. et Duby in Genève, Mém Soc. Phys. XXI. ii. p. 433. t. iv. f. 3 (1872).

PUNGO ANDONGO.—In enclosed rocky valleys near Catete on bark and on ground at the foot of trees; with fr. May 1857. No **106**.

The upper cells of the leaves are unipapillate as in *S. cubense* Mitt. The seta is 9 mm. long.

2. **S. andongense.**

Hypnum Andungense Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 438. t. i. f. 1 (1872). *Raphidostegium Andungense* Jaeg. et Sauerb. Gen. et Spec. Musc. ii. p. 456 (1878). *Hypnum* (*Thamniun?*) *decolorans* Welw. et Duby, *op. cit.*, p. 435. t. iii. f. 3 (1872). *Thamnium decolorans* Jaeg. et Sauerb., *op. cit.*, p. 216 (1877).

PUNGO ANDONGO.—On moist ground by rivulets in the Barrancos de Catete; with fr. May 1857. No. **93**. Barranco grande de Catete; without fr. April and beginning of May 1857. No. **93***b*. A widely cæspitose, brilliantly green, moss found on tree trunks near the great

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cataract of the river Cuanza at Condo; with fr. beginning of March 1857. No. **95**. A laxly cæspitose, glistening and intensely green moss, closely adhering to shaded rocks in Mata de Pungo; with fr. middle of May 1857. No. **75**. Terrestrial, deep green, very widely cæspitose on the banks of rivulets within the præsidium, Barranco de Songue; without fr. end of May 1857. No. **91**. Common, but rarely producing fruit, in damp grottoes by the Casalale brook; with fr. April 1857. No. **92**. Deep green, almost turning to black, very widely cæspitose on moist rocks by the sources of the rivulet in the elevated parts of the Barranco de S. Antonio; without fr. May 1857. No. **94**.

These plants appear to be so closely related as to belong to one and the same species, of which No. 93 is the type. Variations in the size and shape of the leaves are common to all. The youngest leaves usually have their cells plainly unipapillate, while on the older leaves the papillæ are seldom conspicuous. No 92, the type *Hypnum decolorans* Welw. et Duby, is characterised by its darker colour and slower capacity for absorbing water, both of which properties may be due to the influence of its place of growth. The species is at once distinguished from *S. omalosekos* by having a seta more than twice as long, and theca nearly twice as long.

3. **S. linguæfolium.**

Homalia linguæfolia Welw. et Duby in Genève, Mém. Soc. Phys. XXI. ii. p. 431. t. iii. f. 6 (1872).

Golungo Alto.—A bright-green obtuse-leaved moss occurring on the sturdy trunks of trees, especially Meliaceæ (*Entandrophragma*), growing in the shaded primitive forests of Serra de Alto Queta, but sparingly; also in Trombeta and Queta Central; with young and mature fr. Dec. 1855 and Aug. 1857; also on the older trunks of *Entandrophragma angolense* in the forests of Quibolo; with fr. May 1856. No. **170**. With *Eulejeunea Breutelii* on tree trunks in the forests of Queta Central; July 1855. No. **220**, in part.

This species is nearly allied to *S. Basseanum* C. Muell. (Dusén Exsicc. No. 7) and to *S. leptotapes* C. Muell. (Dusén Exsicc. No. 676), both from the Cameroons, but is a smaller plant with the apices of its leaves more obtuse and rounder and the cell-walls thicker. *S. nitens* Mitt., described in Trans. Linn. Soc. xxiii. p. 51 (1860-2), is characterised as having its leaves subacute at apex, and appears to have narrower and less elliptical leaves (*l.c.*, tab. v. fig. 3).

4. **S. auriculatum** Gepp, sp. n.

Monoicous. A small, corticolous, depressed, glistening plant; stem adhering with brown rootlets, vaguely branched; branches prostrate, complanate, of 2 mm. diam. with their leaves, obtuse; lateral leaves patent, median appressed, all concave, from a contracted base longly ovato-lanceolate acute, 1·65 mm. long by 0·6 mm. wide, with margin more or less infolded on one side and serrulate towards apex, sometimes with four or five apical denticulations; nerve slender and vanishing in the middle of the leaf; cells of the basal angles of the leaf quadrate and numerous, and forming on one side of the lateral leaves a flavescent subinflated auricle with laxer cells, upper cells elongate and firm-walled, apical longly elliptic, all smooth; perichætial bracts smaller, acuminate, serrulate; seta 10 mm. long, red, slender, curved at apex; theca sub-horizontal, oval, more than 1 mm.

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long, constricted beneath the mouth when dry; peristome double, the teeth yellow, trabeculate and densely striolate below, attenuated and papillate above, 0·3 mm. long; internal peristome colourless, the plicate membrane rising to half the length of the teeth and bearing subperforated processes and solitary cilia, both papillate; operculum convex, shortly, thickly and obliquely rostrate.

PUNGO ANDONGO.—Cæspitose on trunks of old trees in damp forests near Luxillo; with fr. middle of May 1857. No. **107**. A few small specimens with all their capsules unfortunately lost, gathered on the bark of old trees of "Mucuço" (*Gigalobium abyssinicum*), upon the more elevated rocks (3300 ft.) within the præsidium, beginning of May 1857. No. **81**.

This species is closely allied to *S. linguæfolium*, but is readily distinguished by its acutely pointed leaves usually auriculate on one side of the base.

The following numbers represent indeterminate specimens or mixtures of scraps:—

HUILLA.—With *Brachymenium* (No. 37); on the base of old trunks in forests near Lopollo; with poor fr. May 1860. No. **38**.

CAPE DE VERDE ISLANDS.—The only moss observed by Welwitsch in the whole island of S. Vicente; in company with *Nephrodium hirsutum* on basaltic rocks at an elevation of 1600 to 1800 ft. on the mountain called "Monte Verde"; without fr. end of August 1853. No. **121**.

GOLUNGO ALTO.—A mixture on old trunks of *Edwardia lurida* in Sobato de Quilombo; Feb. 1855. No. **130***b*. A mixture growing with *Barbula* (No. 134) near Bango Aquitamba; May 1856. No. **208**. Mixture amongst *Racopilum*, Mata de Quisucula; Jan. 1855. No. **210**. Mixture, Quisucula; Feb. 1855. No. **289**.

PUNGO ANDONGO.—On the older stems of *Vellosiæ* on the more elevated rocks of the præsidium; end of April 1857. No. **207**.

Some specimens of the protonema of mosses were found among the Fungi. Their numbers are as follows:—

GOLUNGO ALTO.—On the bark of dead branches in the forests of Quibanga; July 1857. No. **43**. On rotting trunks in the forests of Queta Central; June 1856. No. **44**. On the thicker dead branches on the wooded slopes towards Zenza, Sobato de Bumba; Oct. 1855. No. **44***b*.

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HEPATICS.

By F. STEPHANI.

If these plants, collected by Welwitsch in Angola, had been examined twenty years ago, the greater part of them would have been new to us; since that time, however, a great many Hepatics have come in from Western Tropical Africa, particularly from from the islands of St. Thomas and Fernando Po, as well as from the neighbourhood of the Cameroons Mountains, so that only eight new species remain, the descriptions of which are here inserted.

As to the geographical description of the following Hepatics, there are some amongst them which have been found in all tropical countries, as *Eulejeunia flava* Spruce, *Frullania squarrosa* Nees, *Dumortiera hirsuta* R. Bl. et N., *Cyathodium cavernarum* Kunze, *Aneura pinguis* Dumort., and *Anthoceros communis* Steph.; others belong to the flora of tropical South America, like *Lopholejeunea Sagræana* Spr., *Cololejeunea crenatiflora* Steph., and *Symphyogyna brasiliensis* Nees. Quite a number have been found also at the Cape: for instance, *Lejeunea Breutelii*, *L. Pappeana*, *Ricciella Rautanenii*, and *Plagiochasma muricata*.

What remains is entirely of African origin; and the most interesting specimen is *Exormotheca pustulosa*, formerly known from Madeira and Teneriffe. Recently a new species of this genus has been found in Eastern Tropical Africa; so that it may safely be considered a tropical genus of that continent. Graf zu Solms-Laubach in a splendid paper [Bot. Zeit. (1897) pp. 1-16, tab. I.] has already expressed an opinion to this effect.

1. **RICCIA** Micheli Nov. Pl. Gen. p. 106. t. 57 (1729); G. L. et N. Synops. Hep. p. 598 (1846).

1. **R. angolensis** Steph. sp. n.

Dioicous. Plant rather small, glaucous-green, gregarious. Frond 5 to 6 mm. long, from a narrow base obcordate or obconic oblong, shortly furcate, with the forks widely divergent, shortly ligulate, widely rotundate at apex and shortly bilobed, everywhere almost plane, beneath the apex only exhibiting a short groove, on the postical side a little incrassate; costa convex, longly and gradually attenuated into the wings; margins thin. Frond in transverse section six times wider than thick; antical surface plane, postical widely lunate, with the angles longly acuminate, acute. Postical scales large, obliquely ovate, remote, spotted with purple, quite entire, longly produced.

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HUILLA.—Glaucescent-green ; widely cæspitose on rocks in the elevated parts of Serra de Oiahoia near Humpata ; May 1860. No. **255**.

2. **RICCIELLA** A. Br. in Flora od. Bot. Zeit. p. 756 (1821).

1. **R. abnormis** Steph. in Hedwigia xxx. p. 213 (1891).

PUNGO ANDONGO.—Gregarious in caverns of the more elevated rocks on Pedra de Cazella within the præsidium, April 1857 ; in rocky places by the river of Pungo Andongo ; March 1857. No. **229**.

GOLUNGO ALTO.—A fleshy, glauco-papulose, very fragile little plant. On the muddy rocks of the Carenghe rivulet of Alta Queta; April 1856. No. **309***a*. On moist ground by the rivulet of Quarengue in Queta ; Feb. 1856. No. **309***b*.

2. **R. Rautanenii** Steph. in Bull. Herb. Boissier, III. p. 374 (1895).

MOSSAMEDES.—Rather common in the littoral region of the plain of Mossamedes ; in muddy-sandy places by the banks of the river Bero (or Rio das Mortes) near Cavalheiros ; with fr. July 1859. No. **257**.

3. **R. Welwitschii** Steph. sp. n.

Dioicous. Plant rather large, flavous-green, stellately expanded or substratified. Frond up to 6 mm. long, oblongo-obcuneate, shortly furcate at apex, with the forks short divergent, deeply bilobed ; thin, narrowly reticulate owing to the appearance of the lamellæ in transmitted light ; costa very small, a few cells in depth, about one-third the width of the frond, the wings in consequence very much exceeding the width of the costa ; margins very thin, containing very shallow cavities ; stratum of air-cavities shallow, with the lamellæ almost horizontal. Spores 42μ, not reticulately lamellate, rough all over with very crowded short spines.

LIBONGO.—The only Hepatic till then found or observed in the littoral region by Welwitsch. Frond bright-green (not glaucous), stellately expanded, close pressed to the ground. On the shaded moist-sandy banks of the river Lifune above Banza de Libongo (in the Arimo de Sr. Freire) ; with fr Sept. 1858. No. **260**.

3. **CYATHODIUM** Kunze in Lehm. et Lindenb. Pugill. Plant. vi. p. 17 (1834).

1. **C. cavernarum** Kunze, *l.c.*, p. 18.

PUNGO ANDONGO.—Covering the rocks by the rivulet of Mutollo with wide, grass-green, cushion-like patches, the fronds overlapping like scales ; Jan. 1857. No. **226**. A glaucous-green, velvety Hepatic, flabellately expanded on moist ground, on rocks near Cabondo within the præsidium ; Feb. 1857. No. **238**.

GOLUNGO ALTO.—A plant of very thin spongy texture, in the living state of a very bright green colour and stellately expanded on the rocks, but in the dry state completely collapsing ; at the cataracts of the spring called Quibôlo, Monte de Queta, March 1856. No. **312**. Thallus glaucous-green very thin ; on rocks by the Capopa spring ; Jan. 1856. No. **317**. Growing on the ground and moist rocks, with the frond closely adpressed, very thin, glaucous-green, velvety, but unfortunately in the dry state soon turning yellow and collapsing ; common on rocks by the cataracts of Capopa near Sange ; Jan., Feb. and July

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1856. No. **323**. Glaucous-green more or less closely applied to the ground and radiately circular; on rocky soil in moist places by the Delamboa rivulet; middle of June 1857. No. **329**.

CAZENGO.—Bright green, in the living state almost emerald-green, very thin, with thallus or fronds lobed, stellate; on the rocky banks of the river Luinha; Jan. 1855. No. **330**.

4. **PLAGIOCHASMA** Lehm. et Lindenb. Pugill. Plant. iv. p. 13 (1832).

1. **P. tenue** Steph. in Bull. Herb. Boiss. VI. p. 779 (1898).

PUNGO ANDONGO.—Wide spread on the margins of grottoes in elevated parts of the rocks of Pedra de Cazella; Apr. 1856. No. **236**.

The following specimen, which does not yield to the softening action of water, and hence does not admit of identification, may be referred to this genus. Welwitsch describes the living plant as elegant, applied to the ground, branching stellately, with fronds subglaucescent.

PUNGO ANDONGO.—Rather rare in elevated, rather moist, rather shady, rocky places, Pedras de Guinga; March 1856. No. **244**.

5. **FIMBRIARIA** Nees, Hor. Phys. Berol. p. 44 (1820) (*Fimbraria*); G. L. et N. Synops. Hepat. p. 555 (1846).

1. **F. Preussii** Schiffn. apud Steph. in Engl. Bot. Jahrb. xx. p. 303 (1895).

HUILLA.—In elevated woody places by the rivulets of Morro de Monino; Apr. 1860. No. **258**.

6. **DUMORTIERA** Reinw. Blume et Nees in Nova Acta Acad. xii. p. 410 (1825).

1. **D. hirsuta** Reinw. Blume et Nees, *op. cit.*, p. 410.

Marchantia hirsuta Swartz Prod. Fl. Ind. Occ. p. 15 (1788).

GOLUNGO ALTO.—On moist shady rocks, Capopa; with incipient fr., Sept. 1856. No. **310**. Widely cæspitose and remarkable for its shining dark green colour; rather rare on schistose rocks in exceptionally shady places by the rivulet of Capopa, Canguerasange; 1 Dec. 1854. No. **321**. Quisucula; Aug. 1857. No. **321***b*. Fleshy, bright green, in the living state rather rigid and fragile, very sparingly fruiting, growing cæspitosely by the banks of rivulets; sterile Jan. 1856, and with a very few young fr. July 1856. No. **322**. In very shaded spots, Barranca de Capopa; with young fr. 19 Aug. 1857. No. **332**.

7. **MARCHANTIA** Mich. Nov. Pl. Gen. p. 1 (1729); G. L. et N. Synops. Hepat. p. 521 (1846).

1. **M. planiloba** Steph. in Eng. Bot. Jahrb. viii. p. 90 (1886).

AMBACA.—Frequent on moist rocks by the Pamba rivulet; Oct. 1856. No. **245**.

GOLUNGO ALTO.—With both forms of fructification present (the British Museum specimens are quite sterile); common on shaded rocks by Fonte de Capopa, Canguerasange; 1 Dec. 1854. No. **306**. By rivulets near Trombeta; Sept. 1857. No. **307**. On clay soil by the Cazengue rivulet on the mountains of eastern Queta; with fr. June 1856. No. **308**. By the Capopa rivulet; Apr. 1855. No. **319**. A bright green little plant, with thallus rather thick, in the living state

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rather fragile, ornamenting rocks and moist ground by springs and rivulets with its more or less circularly stellate tufts, and frequently bearing fruit; on the wet precipitous sides of a rivulet, Serra de Alta Queta, beginning of Sept. 1855. No. **320**. Rather rare on the banks of the Delamboa stream; Apr. 1856. No. **327**. With trimorphous fructification (male and female receptacles and gemmæ); on the rocky margins of the Coango river; May 1855. No. **328**.

8. **EXORMOTHECA** Mitt. in Godman, Nat. Hist. of the Azores, p. 325 (1870).

1. **E. pustulosa** Mitt., *l.c.*, p. 326.

HUILLA.—Frequent on rocks and ground near by in precipitous elevated parts of Morro de Monino; with fr. April 1860. No. **259**.

9. **ANEURA** Dumort. Comment. Bot. p. 115 (1823).

1. **A. pinguis** Dumort., *l.c.*

ISLAND OF ST. THOMAS.—Bright green, rather fleshy, with wide fronds, interwoven with various mosses, growing on half-rotten trunks in the forests of Novo Destino at an altitude of about 2500 ft.; without fr. Dec. 1860. No. **267**.

10. **FOSSOMBRONIA** Raddi in Mem. Soc. Mod. xviii. p. 40 (1820).

To this genus belongs the following specimen which, having no spores, cannot be identified.

PUNGO ANDONGO.—Almost stemless with leaves glaucous, crisped undulate, with the brownish red capsule borne on a thick white pedicel but easily breaking away; among tufts of mosses in elevated caves, Pedra de Cazella; with fr. beginning of Jan. 1857. No. **237**.

11. **SYMPHYOGYNA** Mont. et Nees in Ann. Sci. Nat. Ser. 2, v. p. 66 (1836).

1. **S. brasiliensis** Nees, *op. cit.*, p. 67.

HUILLA.—On rocks and soil in the vicinity in rather elevated wet woody places by the banks of the Monino river, May 1860. No. **256**.

12. **CEPHALOZIA** Spruce, On Cephalozia, p. 1 (1882).

1. **C. fissa** Steph. in Hedwigia, xxx. p. 204 (1891).

PUNGO ANDONGO.—In company with *Selaginella sp.* in very shaded grottoes in the more elevated parts of the volcanic mountain called Cazella; end of Dec. 1856. No. **246**.

HUILLA.—Delicate, forming beautiful green, velvety coverings on rocks at an elevation of 5200 ft., Morro de Lopollo; 8 Jan. 1860. No. **252**.

13. **SPRUCELLA** Steph. in Engl. Bot. Jahrb. viii. p. 92 (1886); et in Hedw. xxx. p. 214 (1891).

1. **S. succida** Steph., *l.c.*

Lepidozia succida Mitt. in Trans. Linn. Soc. xxiii. p. 57, t. vi. f. 23 (1860).

GOLUNGO ALTO.—With *Leucomium* on rocks in the forests of Queta Zengas. No. **219**. Elegant, glaucous, with fronds horizontally creeping on clay soil near Zengas do Queta; 25 July 1856. No. **283**

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14. **LOPHOCOLEA** Dumort. Rec. d'Observ. p. 17 (1835).

1. **L. Dusenii** Steph. in Hepat. Afric. in Camerunia a P. Dusén collectæ exsicc., sched. No. 247 (*nomen*).

Monoicous. Plant rather small, green or pale-green, densely stratified, corticolous. Stem up to 2 cm. long, sparingly branched. Leaves subopposite, distichously patulous, oblongo-conical, with margins straight, at apex not half as wide as at base, at apex lunately excised, bispinose, the spines being short and nearly of equal size and narrowly triangulate. Leaf-cells 28 μ, at base 28 by 37 μ; trigones minute. Amphigastria three times as wide as the stem, widely lunately excised, on each side bispinose and broadly united with the leaves. Perianths terminal, i.e. not borne on innovations, oblongo-triquetrous, at apex deeply multilaciniate, broadly winged, the wings being irregularly and grossly spinose. Innermost floral leaves little larger than the cauline, at apex truncato-bidentulous, with margins paucidenticulate. Innermost floral amphigastrium small, broadly connate with its proper leaves, subquadrate, quadrilaciniate to half its length, the innermost laciniæ being the stouter. Andrœcia terminal on the branches, fusiform; bracts exciso-bifidulous to one-third of their length and inflatedly lobulate on the postical side, the lobules being united with the amphigastrium.

The original specimen was gathered on the Cameroon mountains above the village of Buea at an elevation of about 5200 ft., on the trunks of trees; 13 July 1891 (Dusén No. 247).

PUNGO ANDONGO.—Not uncommon in shady *Mimosa*-woods by rivulets near Pedras de Guinga; March 1857. No. **230**. Mixed with tufts of mosses in moist clefts of rocks within the præsidium; May 1857. No. **235**.

GOLUNGO ALTO.—Quisucula, April 1856. No. **277**. Widely cæspitose on schistose rocks on the mountains of Alta Queta; March 1859. No. **294**. Among mosses (*Ectropothecium*, etc.), in Mata de Quisuculo; Jan. 1856. No. **311**.

15. **PLAGIOCHILA** Dumort. Rec. d'Observ. p. 14 (1835).

1. **P. amplifolia** Steph. sp. n.

Sterile, rather large, robust, densely depresso-cæspitose, yellowish-green, corticolous. Stem straight, hard, fuscous, up to 3 cm. long, at the top sparingly branched. Leaves fragile, crowded, imbricate, curvately patulous, ovate when flattened, truncate at apex, on the antical side a little decurrent, on the postical side from the very base rotundato-ampliate and very prominently cristate; margin everywhere remotely dentate, the teeth being short and widely triangulate. Cells 25 μ, at base 17 by 34 μ; trigones rather large. The other parts of the plant are wanting.

The original specimen was gathered by Quintas in St. Thomas's Island. The species is to be compared with *P. abyssinica* Mitt.

PUNGO ANDONGO.—Barrancos de Catete; Dec. 1856. No. **247**.

GOLUNGO ALTO.—Without locality; probably Cungulungulo; Feb. or June 1855. No. **276**.

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2. **P. decurrens** Steph. sp. n.

Dioicous. Plant rather small, slender, densely cæspitose, olivaceous. Stem up to 4 cm. long, very much and almost fasciculately branched; branches subsimple and pinnately divided at the top into short floriferous branchlets. Leaves not spreading much from the stem (at an angle of 30°), obliquely oblong, on the postical side shortly inserted, longly incumbent on the stem, on the antical side very longly decurrent, at apex truncate bitridentate, upper margin sparingly dentate, the teeth being widely triangulate and short. Apical cells 17 μ, median 17 by 25 μ, basal 17 by 35 μ; trigones rather large. Perianths terminal on ultimate branchlets, oblongo-obcuneate, on one side winged, at apex truncate, closely and equally dentato-spinose, the spines being slender and setaceous at apex. Innermost floral leaves from a narrow base obliquely ovate, at apex subtruncate, margins everywhere grossly crenato-spinose, quite entire at the base only.

The original specimen was gathered by Dusén in the Cameroons. The species is most distinct; it is easily recognised by its very decurrent leaves, and can be compared with no other species hitherto known.

GOLUNGO ALTO.—On old trunks by rivulets in Alta Queta; July 1857. No. **280**.

3. **P. divergens** Steph. in Hedwigia, xxx. p. 268 (1891).

GOLUNGO ALTO.—On continually wet rocks by the cataracts of the Cuango river near Sange; Aug. 1855. No. **303**. In Mata de Quisucula, near Bango Aquitamba; Jan. 1856. No. **303***b*.

4. **P. præmorsa** Steph. in Engl. Bot. Jahrb. viii. p. 92, fig. 1–3 (1887).

PUNGO ANDONGO.—On trunks near the ground in Mata da Pedra Pungo; May 1857. No. **234**.

GOLUNGO ALTO.—On schistose rocks near the rivulet of Capopa; Oct. 1854. No. **298**. In Mata de Quisucula; Feb. 1855. No. **304**.

5. **P. strictifolia** Steph. in Hedwigia xxx. p. 210 (1891).

GOLUNGO ALTO.—Among mosses on the banks of the Cuango river; June 1856. No. **221**. With *Thuidium gratum* (No. **143**), Alta Queta; Jan. 1856. No. **271**. On Xipepe (*Monodora angolensis*) and other trees, Alta Queta; March 1856. No. **273**. Quisucula: Feb. 1855. No. **290**. Mixed with *Eulejeunea Ecklonii* amongst mosses (*Rhynchostegium*, etc.) on rocks on the banks of the Coango river near Sange; June 1856. No. **325**. Cataract of the Cuango river; 5 July 1856. No. **326**.

6. **P. thomeensis** Steph. in Engl. Bot. Jahrb. viii. p. 81 (1886).

GOLUNGO ALTO.—With *Porotrichum elongatum* (cf. No. **146**), Quisucula; Feb. 1856. No. **274**. In the woods of Sobado Quilombo; July 1856. No. **291**. On trunks of old trees by the side of a rivulet, Zengas da Queta; one specimen found with fr. May 1856. No. **324**.

CAZENGO.—On the right bank of the river Luinha, Mata de Muxaûla; Jan. 1855. No. **275**.

To this genus are referred the following numbers:—

ISLAND OF ST. THOMAS.—Cæspitose, intensely green, in company

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with various mosses covering rotting trunks in dense woods, Novo Destino; Dec. 1860. No. **266**.

GOLUNGO ALTO.—A mere scrap with *Pilotrichella Welwitschii* (No. **145**), Cungulungulo, Feb. 1855. No. **269**.

16. **FRULLANIA** Raddi in Mem. Soc. Mod. xviii. p. 20 (1820).

1. **F. angulata** Mitt. in Journ. Linn. Soc. vii. p. 169 (1864).

GOLUNGO ALTO.—With *Eulejeunea isomorpha*, Cungulungulo; Feb. 1855. No. **222**. Dark purple, or purplish green, springing from the branches of evergreen trees in company with mosses (*Pilotrichella*, etc.) and fruticulose lichens, and then forming long hanging beards 4 to 8 in. in length and very tangled. Dioicous. Involucel large, deeply triquetrous (*i.e.*, with the angles exceedingly prominent), with rostrum straight and rather obtuse, at length split into three almost regularly. Very common on trees in the most elevated woods of Cungulungulo at an altitude of about 2500 to 2700 ft. above sea level; Feb. 1855. No. **285**.

2. **F. diptera** G. L. et N. Synops. Hep. p. 420 (1845).

GOLUNGO ALTO.—Rare on bark and sterile in Alta Queta; Jan. 1856. No. **279**.

CAZENGO.—On old living trunks in elevated parts on the mountain chain called Muxaûla; June 1855. No. **286**.

3. **F. spongiosa** Steph. in Hedwigia, xxxiii. p. 147 (1894).

GOLUNGO ALTO.—Interwoven with *Schlotheimia rugifolia* (No. **132**), on a lofty *Morus* in eastern Queta near Sange; Dec. 1854. No. **278**.

4. **F. squarrosa** Nees in G. L. & N. Synops. Hep. p. 416 (1845).

AMBRIZ.—Among tufts of Collema in rocky woods between Ambriz and Quizembo; Nov. 1853. No. **262**.

GOLUNGO ALTO.—On roots or rhizome of *Orchideæ* growing on *Giganthemum scandens*, Mata Virgem de Quibanga; with abundant fr. No. **282**. On old trunks of *Adansoniæ* near Sange; 17 Feb. 1856. No. **292**. Common on the bark of species of *Ficus*, near Sange; with fr. Dec. 1855. No. **297**. On trunks of *Pseudospondias microcarpa* in the dense woods of Sobato Mussengue; with fr. beginning of Jan. 1856. No. **301**. On *Treculia africana* ("Dizanha"), near Ndelle; Jan. 1856. No. **302**. With *Strepsilejeunea pluriplicata* on rather old trunks in Mata de Quisucula near Bango; Jan. 1856. No. **305**. Common on aerial roots of *Orchideæ* parasitic on *Giganthemum scandens*, Mata virgem de Quibanga; with fr. Jan. 1856. No. **313**. Rather rare on the bark of the tree Musubiri (*Myrianthus arboreus*), Zengas do Queta; March 1856. No. **316**. On the aerial roots of *Orchideæ* growing on the branches of *Adansonia* near Sange; Dec. 1855. No. **333**.

5. **F. trinervis** G. L. et N. Syn. Hep. p. 427 (1845).

GOLUNGO ALTO.—Mata de Quisucula, near Bango; Feb. 1855. No. **315**.

6. **F. (Trachycolea) Welwitschii** Steph. sp. n.

Dioicous? Plant rather small, blackish purple, longly and widely expanded on bark. Stem up to 4 cm. long, with a few long branches at base; branches shortly and densely pinnate. Leaves crowded, widely cordate-ovate, at apex truncato-rotundate somewhat decurved, at the antical base rotundate or a little lobulate, at the back not overlapping the stem. Leaf-cells, marginal 17 μ, median 17 by 25 μ, at the very base 25 by 40 μ,

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very chlorophyllose. Auricle very large, almost reaching the apex of the leaf, almost touching the stem, compresso-semiglobose, at apex shortly acuminate falcato-decurved, with the mouth very wide, gaping, and with the lips not truncate, but more or less curved. Amphigastria very large, contiguous or imbricate, more than thrice the width of the stem, transversely inserted, cuneately narrowed at base, angulate at the sides, incised to one-third at apex, with the sinus straight acute, and the lobules broadly triangular acute. The rest is wanting.

GOLUNGO ALTO.—On the bark of tree-trunks in exceedingly shaded spots on the mountains of Alta Queta ; Oct. 1854. No. **299**.

Very like *F. squarrosa* in habit and size, but differing from that species in its leaves, which are not squarrose, and in its very large auricles.

To this genus belongs the following imperfect specimens :—

PUNGO ANDONGO.—Creeping, pulvinately interwoven, densely clothing stems and branches of *Vellosiæ*, in the living state fuscous-green or golden-green, Pedra de Casamba ; beginning of May 1857. No. **240**.

HUILLA.—Very small, with stem and leaves fuscous-purple ; on the bark of *Sapotaceæ*, on the tree called in the vernacular "Mutambote" (*Chrysophyllum argyrophyllum*), interwoven with *Brachymenium angolense*, etc., in the more elevated parts of Morro de Lopollo ; end of March 1860. No. **251**.

17. **LEJEUNEA** Lib. in Ann. Gén. Sc. Phys. vi. p. 372 (1820).

1. **L. (Acrolejeunea) confertissima** Steph. in Hedwigia xxxi. p. 165, t. xiii. f. 25-28 (1892).

PUNGO ANDONGO.—Sparingly on old trunks of palms (*Elæis guineensis* in cultivation) near Candumba in the valley of the river Cuanza ; March 1857. No. **231**. Growing among *Physcia leucomelas*, on volcanic rocks near Cazella within the præsidium; Feb. 1857. No. **249**.

AMBRIZ.—In company with mosses, etc., among tufts of *Collema* in rocky woods between Ambriz and Quisembo, on the right bank of the river Loge ; Nov. 1853. No. **261**.

2. **L. (Acrolejeunea) Pappeana** Nees in G. L. et N. Synops. Hep. p. 296 (1845).

Acrolejeunea Pappeana Steph. in Hedw. xxviii. p. 166 (1889).

GOLUNGO ALTO.—On living trunks of trees in elevated parts of Cungulungulo ; Feb. 1855. No. **281**. In the woods of Sobado Quilombo ; July 1856. No. **287**.

3. **L. (Cololejeunea) crenatiflora.**

Cololejeunea crenatiflora Steph. in Hedw. xxx. p. 270, t. xxxiii. xxxiv. f. 11, 12 (1891).

ISLAND OF ST. THOMAS.—On the fronds of ferns ; Dec. 1860. No. **265**.

4. **L. (Eulejeunea) Breutelii.**

Eulejeunea Breutelii Steph. in Hedw. xxxv. p. 85 (1896).

GOLUNGO ALTO.—On trunks of trees in the woods of central Queta (Serra do Alta Queta) ; July 1855. No. **220**.

5. **L. (Eulejeunea) Eckloniana** G. L. et N. Synops. Hep. p. 381 (1845).

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GOLUNGO ALTO.—With *Plagiochila strictifolia* and *Rhynchostegium* on rocks on the banks of the Coango river, near Sange; June 1856. No. **325**.

6. **L. (Eulejeunea) flava** Spruce in Trans. Bot. Soc. Edinb. xv. p. 268 (1884).

PUNGO ANDONGO.—On branches of *Xerophyta squarrosa* within the præsidium; May 1857. No. **250**.

GOLUNGO ALTO.—On living and withering branches of various shrubs and trees by the Coango river, near Sange; Aug. 1855. No. **296**.

PRINCE'S ISLAND.—Growing on trunks of palms (*Elæis guineensis*), on the ascent of M. de Papagaio; Sept. 1853. No. **264**.

7. **L. (Eulejeunea) isomorpha** Gottsche in Abh. Nat. Ver. Bremen. vii. p. 355, adnot. (1882).

GOLUNGO ALTO.—Creeping among plants of *Frullania angulata*, Cungulungulo; Feb. 1855. No. **222**. On moss No. 128 (*Cryphæa Welwitschii*) on the highest parts of Cungulungulo; Feb. 1855. No. **268**. Growing on *Cryphæa Welwitschii* in the woods of Sobado de Mussengue, but rare; May 1855. No. **284**. Densely cæspitose, whitish glauco-flavescent, growing on soil and rocks; rare on soil on the rocks of Mata de Quisucula; Feb. 1855. No. **288**.

8. **L. (Eulejeunea) Jungneri.**

Eulejeunea Jungneri Steph. in Hedw. xxxv. p. 80 (1896).

PRINCE'S ISLAND.—On fronds of *Asplenium* in rather elevated parts of the island, at an altitude of 1200 ft.; Sept. 1853. No. **263**.

To the subgenus *Eulejeunea* may be referred the following sterile specimens:—

GOLUNGO ALTO.—Mixed with *Rhynchostegium* in tufts of *Racopilum tomentosum* (No. 165) on rocks by the banks of the Coango river, near Sange; June 1856. No. **223**. With the same mosses at the same spot; middle of June 1856. No. **295**. Growing with *Rhynchostegium* at the waterfall of the Coango, near Sange; 5 July 1856. No. **224**. With *Fissidens angolensis* on rocks of mica-schist near Fonte de Capopa; Dec. 1855. No. **270**.

PUNGO ANDONGO.—On moist earthy humus by cataracts of rivulets near Pedra Cabondo, but very scarce; beginning of May 1857. No. **241**.

9. **L. (Lopholejeunea) Sagræana** G. L. et N. Synops. Hepat. p. 314 (1845); Spruce in Trans. Bot. Soc. Edinb. xv. p. 120 (1884) (*Lopho-Lejeunea*).

Phragmicoma Sagræana Mont. in Ramon de la Sagra Hist. Phys. Cuba Bot. ii. p. 464 (1842), t. xviii. f. 1.

PUNGO ANDONGO.—On rotting trunks in Mata da Pedra Pungo; April 1857. No. **225**. On trunks of palms (*Elæis guineensis* under cultivation) near Candumba, in the valley of the river Cuanza; March 1857. No. **227**.

No. 227 is a small and imperfect specimen referred with doubt to this species.

10. **L. (Lopholejeunea) subinermis** Steph. in Engl. Bot. Jahrb. xx. p. 318 (1895).

PUNGO ANDONGO.—Interwoven with *Thuidium tenuissimum* (No. 51), Barranco Grande de Catete; middle of May 1857. No. **218**.

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To the subgenus *Lopholejeunea* is referred the following sterile specimen :—

PUNGO ANDONGO.—Glaucescent, creeping, laxly cæspitose, on rotting trunks and also on moist ground, Barranco de Songue ; middle of May 1857. No. **243**.

11. **L. (Strepsilejeunea) pluriplicata.**

L. (*Anomalolejeunea*) *pluriplicata* Spruce ex Pearson in Christiania Vidensk. Selsk. Forh. 1887, No. 9 (Hepat. Kynsnan.), p. 5. t. ii.

GOLUNGO ALTO.—With *Frullania squarrosa* on rather old trunks, Mata de Quisucula, near Bango ; Jan. 1856. No. **305**.

Under *Lejeunea* should be placed the following sterile specimen :—

PUNGO ANDONGO.—Frequent on submerged stones and roots of trees in the rivulet Casalalé, near Pedra Songue within the præsidium ; end of Feb. 1857. No. **314**.

18. **RADULA** Dumort. Syll. Jung. Eur. pp. 24, 37 (1831) ; Rec. d'Observ. p. 14 (1835).

1. **R. epiphylla** Mitt. ex Steph. in Hedw. xxiii. p. 151 (1884).

GOLUNGO ALTO.—In company with *Fissidens glaucissimus* (No. 141) and *Alsophila æthiopica* Welw. on moss-clad rocks in the primitive woods of Quisucula ; July 1857. No. **272**. Creeping on the leaves of *Ceranthera* (*Rinorea dentata* Herb. Welw. No. 894) near Zengas de Queta ; July 1856. No. **300**. With *Fissidens glaucissimus*, Quisucula ; July 1857. No. **331**.

19. **MADOTHECA** Dumort. Comm. Bot. p. 111 (1823).

1. **M. subdentata** Mitt. in Journ. Linn. Soc. vii. p. 167 (1864).

PUNGO ANDONGO.—Barrancos de Catete ; Dec. 1856. No. **233**. On moist, shaded rocks, Pedra Songue ; April 1857. No. **239**. Interwoven with tufts of moss No. 101 (*Thuidium varians*), etc., Barrancos de Catete ; beginning of Dec. 1856. No. **248**.

20. **JUNGERMANNIA** Mich. Nov. Pl. Gen. p. 6 (1729).

To this genus are referred two specimens which are sterile and in bad condition.

PUNGO ANDONGO.—On rocks submerged during the rainy season for one or two months in the Tangue river, near Catete ; May 1857. No. **242**.

HUILLA.—In company with *Utricularieæ*, etc., in rather elevated swampy places in the Monino district ; April 1860. No. **254**.

21. **ANTHOCEROS** Mich. Nov. Pl. Gen. p. 10 (1729).

1. **A. communis** Steph. in Bull. Herb. Boiss. v. p. 86 (1897).

PUNGO ANDONGO.—Widely cæspitose, intensely green, with a fleshy deeply lobed frond ; common by springs in shaded rocky places near Catete ; with fr. May 1857. No. **228**.

GOLUNGO ALTO.—Rio Mûio, Quilombo ; July 1856. No. **293**. Fronds rather fleshy, dark green ; always in company with *Marchantiæ*, but not common ; on rocks and soil by the cataracts of the Capopa spring ; with fr. end of Aug. 1855. No. **318**.

HUILLA.—In company with *Eriocauloniæ*, *Burmannia*, and *Xyrideæ*,

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in the more elevated wet swampy woody places at an altitude of 5000 ft.; with fr. April 1860. No. **253**.

22. **NOTOTHYLAS** Sulliv. Musci Alleghan. p. 69 (1846).

1. **N. angolensis** Steph. sp. n.

Dioicous. Plant large, green, depresso-cæspitose. Frond 10 mm. long, from a narrow base widely obconic, at apex thick, lobulate, very crispate. Costa very longly radicellose, abruptly produced, yet shallow; wings of the frond longly attenuate. Capsules arising from the margin of the frond, procumbent, from a very small conical inserted bulb cylindrical, acuminate, obtuse, ascending in a curve, with walls thick, formed of short very incrassate cells; stomata none. Spores 34 μ, flavescent, smooth; elaters a little smaller than the spores, with the spiral fibre reduced to three lamellæ which run round the wall meridionally. Anthers unknown. Involucre large, 3- or 4-winged superficially with minute lamellæ, especially rough on the wings.

PUNGO ANDONGO.—Velvety green, flabellately applied to the ground in swampy places, which were becoming dry, between Condo and Quisonde, at an altitude of about 3000 ft.; with perfect fr. 12 March 1857. No. **232**.

The plants are very crowded in growth, the younger fronds running over the old ones in all directions; they are very thin at the base and stout and fleshy in the upper part of the frond; the margin bears numerous small and crisped lobes, particularly about the growing point, which lies safely buried under them. in the deep cleft of the apex. This species is a near ally of *N. decurva* Mitten, and differs from that species in the size and thickness of the frond. The size and sculpture of the spores of *N. decurva* are not stated by the author.

2. **N. flabellata** Steph. sp. n.

Anthoceros flabellatus Welw. ms.

Monoicous. Plant very large, densely stratified, green at apex, elsewhere flavo-rubescent. Frond up to 3 cm. long, repeatedly furcate, with the forks very thin (3 to 4 cells thick), with the margin remotely pinnate; pinnæ small, minutely pinnulate; the whole frond exceedingly irregular, as though coarsely lacerated, formed of large cells, without cavities. Capsules solitary or in pairs, arising from the margin of the frond, which is always innovated from the base of the involucre, small (1 mm. long), clavate, with a large inserted basal bulb; involucre smooth, very thin, of oblique growth, completely enveloping the capsule, as in the other members of the genus. Valves formed of very long, very incrassate and very fragile cells; stomata none. Spores small (25μ), under the microscope brown, minutely rough. Elaters very short (28 by 34μ), more than twice as large as the spores, sub-hyaline, bispirous, with the spirals laxly coiled. Anthers solitary? in a large cavity.

PUNGO ANDONGO.—Plant orbicular, 1 to 4 in. wide, bright green, with fruits bright orange shining as if varnished; on wet rocks by the rivulet of Casalalè within the præsidium, at an elevation of about 3000 ft.; with perfect fr. May 1857. No. **131**.

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A very curious plant, the largest of the genus, extremely thin and very much branched, quite unlike any other species of *Notothylas*; the involucre of the capsule is decumbent, being inserted on one side, but for a very short distance only; very curious also is the innovation of the frond from the base of the fruit, quite a new feature in this class of plants, of which the terminal cells are used up for the formation of the pistillidia. The elaters are formed inside a mother-cell (just like the spores, 4 together) and are real tetrahedrons; but they lose their form and become inflated by the action of the spiral bands, as soon as they are set free.

Notothylas has always numerous pistilla within one flower; the occurrence of 2 capsules springing from the same point is therefore not surprising, though it has never before been observed.

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CHARACEÆ.

The Characeæ of Welwitsch's Herbarium were determined by Alexander Braun and included in his "Characeen Afrika's" (in Monatsber. Preuss. Akad. Wissensch. Dec. 1867, pp. 782–800, 873–944; Berlin 1868). A few subsequent modifications appeared in Braun's posthumous "Fragmente einer Monographie der Characeen," edited by Dr. Otto Nordstedt in Abhandl. Königl. Akad. Wissensch., pp. 211, tt. 7; Berlin 1882.

1. **NITELLA** Agardh Syst. Algar. p. xxvii. (1824).

1. **N. leptoclada** A. Br. in Berlin. Monatsber. Preuss. Akad. Dec. 1867, p. 880 (1868).

HUILLA.—In company with species of *Ottelia* and *Blyxa* in very deep woodland ponds near Lopollo, at the spot where the Munanos pitched their camp; with fr. May 1860. No. **499**.

LOANDA.—Rather rare at the sides of deep rain-water pools near the country house (Museque) of Luiz Gomes in the plain above Loanda (not seen by Welwitsch in 1853-4); with unripe fr. 10 Jan. 1858. No. **495**.

2. **N. huillensis** A. Br. et Welw. in Berlin, Monatsber. Preuss. Akad. Dec. 1867, p. 892 (1868); confer tab. vi. fig. 164 in Berlin. Akad. Abhandl. 1882.

HUILLA.—Growing in mud or on small stones under running water; fronds cæspitose, monosiphoneous, shining when dry; ramifications bearing fruit, and coated with a hyaline substance of a Nostochoid-brown appearance, and fused into a globule. Common in the Mupanda rivulet, which flows into Lake Ivantâla; also in the Ema rivulet in Monino; with fr. 1 March and 11 April 1860. No. **496**.

2. **CHARA** Vaill.; Agardh. Syst. Algar. p. xxvii. (1824).

1. **C. fœtida** A. Br. in Ann. Sci. Nat. Sér. 2. I. p. 354 (1834); Flora xviii. i. p. 63 (1835).

Var. **subinermis** A. Br. Schweiz. Charac. p. 23 in Schweiz. Gesellsch. Neue Denkschr. x. (1849); in Berlin. Monatsber. Preuss. Akad. Dec. 1867, p. 942.

MOSSAMEDES.—In ponds alongside the banks of the river Bero near the town of Mossamedes; a single specimen, June 1859. No. **500**. In pools by the banks of the river Caroca (Croque) near Cabo Negro (16° S. lat.), 12 geographical miles' distance from the mouth of the river; abundant in the river near S. João de Croque; with fr. 2 Sept. 1859. No. **498**. Growing in company with *Marsilea*, and mixed with a few fragments of *Chara angolensis*, in small sluggish streams, entirely

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dried up in winter, between Mossamedes and Cavalheiros; a rare plant; July 1859. No. **497**.

PUNGO ANDONGO.—Common in a salt stream in Sobato de Dungo, not far from Quitage; in company with *Ruppia*; end of March 1857. No. **492**.

2. **C. brachypus** A. Br. in Hook. Journ. Bot. 1849, p. 298; in Berlin. Monatsber. Preuss. Akad. Dec. 1867, p. 939.

LOANDA.—Excessively fragile; obscure green during life, and growing not in thick crops (as is usual with Charas) but in isolated tufts. Not uncommon at the margins of rain-water ponds near Quicûxe in the plain of Loanda; beginning of May 1854. No. **494**.

3. **C. gymnopus** A. Br. Schweiz. Charac. p. 23 in Schweiz. Gesellsch. Neue Denkschr. x. 1849 (*nomen*); in Berlin. Monatsber. Preuss. Akad. Dec. 1867, p. 942.

Var. **angolensis** A. Br. Fragmente Monogr. Charac. edid. Nordstedt in Berlin. Akad. Abhandl. 1882, p. 191.

C. angolensis A. Br. in Berlin. Monatsber. Preuss. Akad. Dec. 1867, p. 943.

BARRA DO BENGO.—Not uncommon in the barely salt waters of the great lake of Quisequêle below Quifandongo at the mouth of the river Bengo; Dec. 1853. No. **493**.

MOSSAMEDES.—In small quantity mixed with *C. fœtida* var. *subinermis* in small slowly running streams quite dried up in winter, between the town of Mossamedes and Cavalheiros; July 1859. No. **497**.

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MARINE ALGAE.

By ETHEL S. BARTON.

CYANOPHYCEÆ.

1. **HYELLA** Born. & Flah. in Morot, Journ. de Bot. 1888, ii. 162.

1. **H. cæspitosa** Born. & Flah. *l.c.*

LOANDA.—Near the shore ; March 1854. No. **36***a*.

CHLOROPHYCEÆ.

1. **ULVA** L. Gen. 326.

1. **U. Lactuca** L. Sp. Pl. ii. p. 1163.

LOANDA.—On the shore; Feb. 1854. Near S. Pedro ; July 1854 No. **33**.

2. **U. fasciata** Del. Egypt vol. ii. p. 297.

LOANDA.—On rocks of the sea near S. Pedro, Morro de Lagostas, frequent ; Feb. and July 1854. No. **34**.

2. **ENTOCLADIA** Reinke in Bot. Zeit. 1879, 476.

1. **E. viridis** Reinke, *l.c.*

LOANDA.—In *Nitophyllum* ; July 1854. No. **100**.

3. **DASYCLADUS** Ag. in Reg. Flora, 1827, ii. 640.

1. **D. clavæformis** Ag. *l.c.*

MADEIRA.—Funchal. No. **266**.

4. **CAULERPA** Lam. in Desv. Journ. Bot. ii. 141.

1. **C. Selago** Ag. Sp. Alg. p. 442.

ST. VINCENT, CAPE DE VERDE.—On rocks covered by volcanic sand; Aug. 1853. No. **214**.

2. **C. scalpelliformis** Ag. Sp. Alg. p. 437.

LOANDA.—S. Pedro ; Feb. 1854. No. **46**.

ISLAND OF ST. THOMAS.—On the shore of the island (below the equator), together with *Codium tomentosum* ; Dec. 1860. No. **262**.

3. **C. clavifera** Ag. Sp. Alg. p. 437.

ST. VINCENT, CAPE DE VERDE.—Very rare on rocks covered with volcanic sand, Porto de Mindello ; 22 Aug. 1853. No. **215**.

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5. **CODIUM** Stackh. Ner. Br. p. xvi.

1. **C. elongatum** Ag. Sp. Alg. p. 454.

LOANDA.—Thrown up on the shores of the island, near S. Pedro; Oct. 1853; Feb. and May 1854. No. **48**.

2. **C. tomentosum** Stackh. Ner. Br. p. 24.

LOANDA.—Frequent; Feb. 1854. No. **47**.

6. **HALIMEDA** Lam. in Nouv. Bull. Soc. Philom. Nov. 1812, 186.

1. **H. Tuna** Lam. Hist. Polyp. fl. p. 309.

ST. VINCENT, CAPE DE VERDE.—Rare on basaltic shore; Aug. 1853. No. **247**.

PHÆOPHYCEÆ.

1. **CYSTOSEIRA** Ag. Sp. Alg. i. 50.

1. **C. Abies-marina** Ag. Sp. Alg. i. p. 54.

ST. VINCENT, CAPE DE VERDE.—Rather frequent and well-developed on volcanic rocks near Praia de Galè; 20 Aug. 1853. No. **221**.

2. **PADINA** Adans. Fam. des Plantes, pt. ii. 13.

1. **P. Pavonia** Gaill. Dict. Class. Nat. vol. xii. p. 589.

LOANDA.—On rocks close to the shore of the ocean near S. Pedro, frequent; Feb. and July 1854. No. **40**.

ST. VINCENT, CAPE DE VERDE.—Thrown up near Praia de Galè; Sept. 1853. No. **210**.

3. **DICTYOTA** Lam. in Desv. Journ. Bot. ii. 38.

1. **D. dichotoma** Lam. Essai p. 58.

PRINCE'S ISLAND.—On rocks of the ocean, not infrequent, close to the shore. Bahia de S. Antonio; 20 Sept. 1853 No. **258**.

4. **HYDROCLATHRUS** Bory in Dict. Class. viii. 1825, 419.

1. **H. cancellatus** Bory, *l.c.*

LOANDA.—Thrown up by the Atlantic at Praia de Gamba, frequent; 4 Dec. 1853; 3 Feb. 1854. No. **45**.

5. **COLPOMENIA** Derb. & Sol. Mém. Phys. Alg. 11.

1. **C. sinuosa** Derb. & Sol. *l.c.*

LOANDA.—Thrown up by the ocean near S. Pedro, very rare. No. **44**.
MADEIRA.—Funchal, 1852. No. **265**.

FLORIDEÆ.

1. **GALAXAURA** Lam. Polyp. Flex. 259.

1. **G. fragilis** Dcne. Corall. p. 104.

Very frequent on the shores of St. Vincent, Cape de Verde, thrown up by the sea in great abundance.

ISLAND OF ST. VINCENT, CAPE DE VERDE.—On volcanic rocks near Praia de Galè, especially frequent; 21 Aug. 1853. No. **220**.

2. **G. obtusata** J. Ag. Sp. Alg. vol. iii. pt. 1, p. 525.

LOANDA.—1854. No. **275**.

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2. **CAULACANTHUS** Kütz. Phyc. Gen. 395.

1. **C. ustulatus** Kütz. *l.c.*

MOSSAMEDES.—Very frequent on calcareous rocks of the sea near Mossamedes ; July 1859. No. **76**. Frequent on calcareous and sandstone submarine rocks near Mossamedes ; July 1859. No. **77**.

ST. VINCENT, CAPE DE VERDE.—On the shore, Praia de Galè ; Aug. 1853. No. **230**.

3. **GELIDIUM** Lam. in Ann. Mus. Hist. Nat. Paris, xx. 1813, 128.

1. **G. corneum** Lam. *l.c.*

BENGUELLA.—On Patellæ thrown up by the Atlantic near Benguella ; June 1859. No. **75**.

LOANDA.—On rocks near S. Pedro, frequently covering all the rocks ; July 1854. No. **50**.

4. **GIGARTINA** Lam. in Ann. Mus. Hist. Nat. Paris, xx. 1813, 134.

1. **G. Teedii** J. Ag. *l.c.*

LOANDA.—Morro das Lagostas, rare ; July 1854. No. **117**.

5. **FLAHAULTIA** Born. Alg. Schousb. 278.

1. **F palmata.** Barton in Journ. Bot. 1897.

LOANDA.—Frequent near Morro das Lagostas ; Jan. 1854. No. **65**. Angola, Fort Conceiçao ; July 1854. Nos. **78**, **80**. On shells and rocks near Morro das Lagostas, frequent ; Jan. 1854. No. **99**.

6. **GRACILARIA** Grev. Alg. Brit. 121.

1 **G. confervoides** Grev., *l.c.*, p. 123.

LOANDA.—Thrown up on the island, rare ; Jan. 1854. No. **95**.

7. **HYPNEA** Lam. in Ann. Mus. Hist. Nat. Paris, xx. 131, 1813.

1. **H. musciformis** Lam., *l.c.*

LOANDA.—When living, mostly pale brown and fragile ; when thrown up and exposed to the air it becomes flaccid and of a red, purple, and orange colour, variegated. Fruit occurs rarely. Frequent and of various forms on rocks, shells and other algæ on the shores of Loanda, where large quantities are thrown up. On coralline rocks near S. Pedro ; July 1854. No. **84**.

ST. VINCENT, CAPE DE VERDE.—On volcanic rocks and on other algæ on the shore, frequent. Praia de Galè ; Aug. 1853. No. **250**.

8. **RHODYMENIA** J. Ag. Alg. Liebm. 15.

1. **R. palmetta** Grev. Alg. Brit. p. 88.

LOANDA.—On rocks at Morro das Lagostas ; Jan. 1854. No. **115**.

9. **CHRYSYMENIA** J. Ag. Alg. Med. et Adriat. 105.

1. **C. uvaria** J. Ag., *l.c.*, p. 106.

St VINCENT, CAPE DE VERDE.—On the shores. When alive, rose-purple, wine-colour ; Aug. 1853. No. **240**.

10. **PLOCAMIUM** Lam. Ann. Mus. Hist. Nat. Paris, xx. 137, 1813.

1. **P. coccineum** Lyngbye, Tent. Hydrophyt. Dan. p. 39.

ST. VINCENT, CAPE DE VERDE.—On volcanic rocks near Praia de Galè ; 21 Aug. 1853. No. **241**.

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11. **ACANTHOPHORA** Lam. in Ann. Mus. Hist. Nat. Paris, xx. 132, 1813.

1. **A. Thierii** Lam., *l.c.*

LOANDA.—On shells near the shore of the island Loanda and Ilha dos Passeros; Jan. and April 1854. No. **112**. Loanda; Oct. 1853. No. **113**. On oyster-shells near Cabo Lombo; 28 Nov. 1853. No. **114**.

12. **POLYSIPHONIA** Grev. Flora Edin. 308.

1. **P. elongata** Harv. in Hook. Brit. Flora p. 333.

LOANDA.—On rocks on the Atlantic shores of Loanda near Fort S. Pedro and Conceiçao, frequently thrown up; Dec. 1853 and Jan. 1854. No. **52**.

2. **P. pennata** J. Ag. Alg. Med. p. 141.

LOANDA.—On rocks of the Loanda shore near Fort S. Pedro; Feb. 1854. Penedo, July 1854. No. **96**.

13. **BOSTRYCHIA** Mont. in Sagra Hist. Cuba, Paris, 1838-42, 39.

1. **B. tenella** J. Ag. Sp. Alg. vol. ii. pt. 3, p. 369.

LOANDA.—On trunks of *Rhizophora Mangle* immersed at high water, near Cabo Lombo, on the shores of Loanda, occurring rarely. but always broadly cæspitose, covering the trunks exactly like a *Hypnum*; 29 Nov. 1853. Nos. **59**, **60**.

14. **SPYRIDIA** Harv. in Hook. Br. Fl. ii. pt. i. 1833, 336.

1. **S. aculeata** Kütz. Phyc. Gen. p. 377.

ST. VINCENT, CAPE DE VERDE.—22 Aug. 1853. No. **217**.

2. **S. clavata** Kütz. in Linn. 1841, p. 744.

LOANDA.—On the shore, thrown up by the ocean; this one specimen near Fort de Conceiçao; Jan. 1854. No. **58**.

15. **CERAMIUM** Roth, Cat. Bot. iii. 106.

1. **C. diaphanum** Roth., *l.c.*, p. 154.

LOANDA.—Morro das Lagostas, on a species of *Hypnea*, etc.; Jan. 1854. Nos. **67**, and on **65**.

16. **CENTROCERAS** Kütz. in Linnæa, 1841, 741.

1. **C. clavulatum** Mont. Fl. Alg. p. 140.

LOANDA.—On rocks covered by sand on the shore near Fort de Conceiçao; Dec. 1853. No. **61**. Near S. Pedro; Feb. and April 1854. No. **64**. On rocks of the sea near Morro das Lagostas and S. Pedro, frequent; Jan. 1854. No. **66**.

17. **PEYSSONELIA** Dcne. Pl. Arab. 168.

1. **P. rubra** J. Ag. Sp. Alg. ii. p. 502.

LOANDA.—On rocks and various algæ, Praia de Penedo; Jan. and Feb. 1854. No. **121**.

ISLAND OF LOANDA.—May 1854. No. **123**.

ST. VINCENT, CAPE DE VERDE.—On rocks and various algæ near volcanic rocks, but rarely well developed; 22 Aug. 1853. No. **233**.

PRINCE'S ISLAND.—On rocks in the Atlantic. here and there, growing gregariously; 21 Sept. 1853. No. **256**.

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2. **P. Harveyana** Crn. in J. Ag. Sp. Alg. vol. ii. pt. 2, p. 501.

LOANDA.—Morro das Lagostas ; July 1854. No. **122.**

ST. VINCENT, CAPE DE VERDE.—Praia de Galè ; 22 Aug. 1853. No. **236.**

18. **GRATELOUPIA** Ag. Spec. Alg. i. 221.

1. **G. lanceola** J. Ag. Sp. Alg. vol. ii. pt. i. p. 182.

LOANDA.—Fronds gregarious, chiefly covering the sides of rocks and stones ; fertile plants always much branched, when sterile smaller. Colour when alive a dark steely purple. Hab. on the Angola shores near Morro das Lagostas, rare, on rocks ; July 1854. No. **120.**

19. **MELOBESIA** Lam. Hist. Polyp. Flex. 313.

1. **M. corticiformis** Kütz. Sp. Alg. p. 696.

ST. VINCENT, CAPE DE VERDE.—On the fronds of *Gelidium rigidum* on the shore ; Aug. 1853. No. **251.**

20. **CORALLINA** Lam. Polyp. fl. p. 275.

1. **C. officinalis** Lam. Fauna Suec. n. 2234.

MADEIRA.—Praia de Camara dos Lobos ; Aug. 1853. No. **268.**

A certain number of the algæ collected by Dr. Welwitsch are not sufficiently well preserved to be named specifically, and are therefore not given here. Among these are species of *Cyanophyceæ*, *Cladophora*, *Sargassum*, *Dictyota*, *Corallineæ*, *Gracilaria*, *Polysiphonia*, and *Nitophyllum*.

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FRESHWATER ALGÆ.

DETERMINED BY

W. WEST, F.L.S., AND G. S. WEST, B.A., A.R.C.S.

The algæ which form the subject of this paper were collected some forty years ago by Dr. Welwitsch during his eight years' residence in Angola. They are chiefly from the latter region, but a few are from Benguella and Sierra Leone. The specimens are all dried ones, and for the most part are mounted on paper. Portions of all had to be soaked out for investigation, the results of which have been very gratifying, as by this means, after a detailed examination, many of the smaller species have been observed. These latter, however, had not been collected as such, but, independently entangled among other conspicuous species, had been collected with them. The Desmids had practically all been unconsciously obtained in this way, few, if any, collections having been made from places in which one would expect to find Desmids in abundance; and yet about 130 fine species (including fifty undescribed ones) have been found as intruders amongst other algæ. From these mere samples one is led to wonder as to the richness of the Desmid-flora of Tropical Africa.

Very little is known concerning the Freshwater Algæ of Africa, only a few small scattered papers having as yet been published; and this extensive collection—one in which almost all the groups are represented—very considerably enlarges our knowledge of the geographical distribution of these plants.

At the time these algæ were collected the great majority of the species were as yet undescribed. They form part of the Welwitsch collection deposited in the British Museum, and the numbers after the species refer to the numbers on the sheets of this collection. A few of the species can hardly be considered as freshwater ones, but as they were in the collection we have included them.

It is interesting to note that the earliest collection of algæ made in Africa has been found to be more extensive and representative than any hitherto described. The species are localised under the various districts of the region, exactly as indicated by Welwitsch on his herbarium labels. (Ex Journ. Bot. 1897, pp. 1, 2.)

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FLORIDEÆ.

I. BATRACHOSPERMEÆ.

1. **BATRACHOSPERMUM** Roth (1800).

1. **B. angolense** W. et G. S. West in Journ. Bot. 1897, p. 2.
Lemanea angolensis Welw. in Herb.

PUNGO ANDONGO.—Freq. ast unico loco ad rupes submersas in rivulo de Cabondo socialis cum Podostemaceis; med. Feb. 1857. No. **1**.

This may well be taken at first sight for a *Lemanea* with very numerous nodes, the short lateral branches which clothe the axes of the filaments being so very dense and of such uniform length that a surface view appears almost parenchymatous. The filaments are not much thicker at the nodes than between them.

2. **B. nigrescens** W. et G. S. West in Journ. Bot. 1897, p. 2.

PUNGO ANDONGO.—Freq. ast unico loco in brachio laterali flum. Cuanza prope ejus cataract. ad Condo; March 1857. No. **2**.

This is a rather noteworthy species, being so much branched that in well-developed specimens the branches aggregate to form narrow pencils; the plant when dry is almost black, and looks like some of the marine *Florideæ*.

3. **B. gracillimum** W. et G. S. West in Journ. Bot. 1897, p. 2.

PUNGO ANDONGO.—Ad lapides submersas in rivulo de Tangue; May 1857. No. **3**.

This very beautiful species is characterized by its numerous elongate and delicate branches, which bear the short uniform lateral branches evenly without interruption along their whole length. The globose clusters of lateral branches, which are developed on every 7th to 12th node, are no doubt connected with the fructification; their terminal cells are of a different form from the others, being larger and mostly subglobose. The axis of the filament does not pass through the centre of this dense mass of branches, but the attachment of the globular mass is at one side of the node from which they arise.

4. **B. huillense** Welw. ex W. et G. S. West in Journ. Bot. 1897, p. 3.

HUILLA.—Freq. ad rupes lapidesque submersas in rivulis prope Lopollo; May 1860. No. **4**. Also fragments from No. **187**.

This species is well marked by its peculiar and dense branching, specimens dried on paper appearing hypnoid. It reminds one of a delicate *B. atrum* Harv., except as to its branching. This species and *B. gracillimum* adhere very well to paper, while *B. nigrescens* and *B. angolense* adhere but slightly.

II. HILDENBRANDTIACEÆ.

1. **HILDENBRANDTIA** Nardo (1845).

1. **H. rivularis** J. Ag. Species Algar. ii. 495; Rabenh. Fl. Europ. Alg. iii. 408; W. et G. S. West in Journ. Bot. 1897, p. 3.

GOLUNGO ALTO.—Maculis magnis belle sanguineis rupes siliceo-arenosas juxta Fontem de Capopa ornat; Sept. 1855. No. **149**.

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2. **H. angolensis** Welw. ex W. et G. S. West in Journ. Bot. 1897, p. 3.

GOLUNGO ALTO.—Ad silices in rivulis sylv. primit. de Quibanga pr. Sange; June 1857. No. **150** (I. and II.). Welwitsch remarks that the rocks were of a most beautiful rose-colour for half an hour's walk along the stream.

CHLOROPHYCEÆ.

III. ŒDOGONIACEÆ.

1. **BULBOCHÆTE** Ag. (1717).

1. **B. angulosa** Wittr. & Lund. in Wittr. Prodr. Monog. Œdog. 45 (1874); W. et G. S. West in Journ. Bot. 1897, p. 4.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

In these African plants the oogonia were under the androsporangia and were rotundo-rhomboid, with the superior margins straight (not retuse); the nannandria were not epigynous, but scattered.

2. **ŒDOGONIUM** Link (1820); Wittr. em.

1. **Œ. cryptoporum** Wittr. Dispos. Œdog. Suec. 19 (1870); W. et G. S. West in Journ. Bot. 1897, p. 4.

LOANDA.—Represa do Maghelano pr. Boa vista; Feb. 1854. No. **194**.

2. **Œ. crispum** Wittr. Prodr. Monog. Œdog. 10 (1874).

Var. **uruguayense** Magn. & Wille, Bidrag til Sydamerik. Alg.-fl. 39, t. ii. fig. 63 (1884); W. et G. S. West in Journ. Bot. 1897, p. 4.

LOANDA.—Represa do Maghelano pr. Boa vista, c. *Œ. cryptoporo*; Feb. 1854. No. **194**.

3. **Œ. gracillimum** Wittr. & Lund. in Wittr. Prodr. Monogr. Œdog. 15 (1874).

Forma major W. et G. S. West in Journ. Bot. 1897, p. 4.

HUILLA.—In udis sylvaticis et apricis inter Monino et lac. Ivantala, c. *Porphyrosiphone Notarisii* Kütz.; April 1860. No. **14**.

4. **Œ. Itzigsohnii** De Bary, Ueb. Œdog. und Bulb. 56, t. iii. fig. 29-32 (1864); Wittr. Prodr. Monogr. Œdog. 16 (1874).

Var. **minor** West, Notes on Scotch Freshw. Alg., Journ. Bot. 1893, p. 97; W. et G. S. West in Journ. Bot. 1897, p. 4.

PUNGO ANDONGO.—Freq. c. *Scytonemate Myochrous* Ag. var. *chorographico*, temp. pluv. (i.e. Dec. usque Apr.) læte vegetans, ad Pedras negras in summis rupibus Præsidii; Feb. 1857. No. **6**.

The specimens were even a little smaller than those originally described from the Orkney Isles.

5. **Œ. huillense** W. et G. S. West in Journ. Bot. 1897, p. 5, t. 365, f. 7, 8.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

The nearest species to this is *Œ. mammiferum* Wittr. (Prodr. Monogr. Œdog. 16), from which it differs in having eight equal processes round the subrhomboid oogonia, and in the globose oospores.

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6. **Œ. Rothii** (Le Cl.) Pringsh. Beitr. zur Morph. d. Œdog. i. 69, t. v. fig. 4 (1858); Wittr. Prodr. Monogr. Œdog. 18 (1874).
Forma major W. et G. S. West in Journ. Bot. 1897, p. 5.

PUNGO ANDONGO.—Alga læte viridis parce vel submuscosa, ad ramulos Podostemacearum (*Tristicha trifaria* Tul.) in rivulis Præsidii (Casalalé); March 1857. No. **105**.

The small obovate nannandria occurred singly or 2-4 on the under side of the oogonia.

7. **Œ. hormosporum** W. et G. S. West in Journ. Bot. 1897, p. 5.

HUILLA.—Alga lubrica, viridis, socialis cum *Nitellæ* sp. in stagnis pr. Catumba; April 1860. No. **189**.

8. **Œ. Welwitschii** W. et G. S. West in Journ. Bot. 1897, p. 5.

LIBONGO.—Freq. circa lacus ad margines flum. Lifune; Sept. 1858. No. **204**.

9. **Œ. tapeinosporum** Wittr. Prodr. Monogr. Œdog. 36 (1874).
Var. **angolense** W. et G. S. West in Journ. Bot. 1897, p. 5.

PUNGO ANDONGO.—Ad latera boreal. et occid. de Pedra Songue, c. *Scytonemate Myochrous* var. *chorographico* et *Dichotriche gypsophila*; April 1857. No. **12**.

10. **Œ. londinense** Wittr. *l.c.* 39 (1874). Forma oogoniis supra medium circumscissilibus, cellulis suffultoriis sæpe inflatis. W. et G. S. West. in Journ Bot. 1897, p. 6.

PUNGO ANDONGO.—In pascuis spongiosis breviter graminosis juxta rupes gig. Præsidii pr. Catete, sparsis c. *Dichotriche gypsophila*; May 1857. No. **111**.

11. **Œ. angustissimum** W. et G. S. West in Journ. Bot. 1897, p. 6.

HUILLA.—In uliginosis editoribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. **15**.

This species comes nearest to *Œ. tenuissimum* Hansg. (in Notarisia, 1888, 398), but differs in being narrower, in having longer cells, binate oogonia, and smaller oospores which completely fill the latter.

12. **Œdogonium** sp. W. et G. S. West, *l.c.*

HUILLA.—Epiphyticum in *Zygnematis* sp. in paludibus exsiccandis; April 1860. No. **176**. This species may be a form of *Œ. tenuissimum* Hansg. with longer cells, or of *Œ. minutissimum* Grun. (in Rabenh. Fl. Europ. Algar. iii. 352).

13. **Œdogonii** sp. W. et G. S. West, *l.c.*

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca, et Lopollo; May 1860. No. **15**. Insufficient for accurate determination.

14. **Œdogonii** sp. W. et G. S. West, *l.c.*

MOSSAMEDES.—Freq. in stagnis puris ad ripas flum. Bero; Aug. 1859. No. **190**.

15. **Œdogonii** sp. W. et G. S. West, *l.c.*

PUNGO ANDONGO.—Stirps amœnissime viridis, ad limum juxta rivulum Præsidii Casalalé crescens; Feb. 1857. No. **106**. Ad ramulos Podostemacearum in rivulis Præsidii (Casalalé); Mar. 1857. No. **105**.

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IV. ULVACEÆ.

1. **ENTEROMORPHA** Link (1820); em. J. Ag. (1883).

1. **E. Welwitschii** J. Ag. Till Algernes Systemat. vi. 143 (1883); W. et G. S. West in Journ. Bot. 1897, p. 6.

Enteromorpha sp. Welw. Phyc. Lusit. n. 289.

LOANDA.—Ad folia palmarum (*Cocos nucif.*) diutius in oceano agitata, prope Praia de Nazareth; Feb. 1854. No. **29**.

The occurrence of this species is noteworthy, as Welwitsch had previously collected it in Portugal on *Scirpus maritimus*.

2. **E. tubulosa** Kütz. Tab. Phyc. vi. 32, f. 2; W. et G. S. West in Journ. Bot. 1897, p. 7.

LOANDA.—On a floating *Adansonia digitata* on the shore (Praia, of S. Jago), forming a green layer all over it; Nov. 1853. No. **31**.

V. ULOTRICHACEÆ.

1. **HORMISCIA** Fries (1835); em. Aresch. (1866).

1. **H. subtilis** De Toni, Syll. Alg. 159, 160 (1889); W. et G. S. West in Journ. Bot. 1897, p. 33.

Ulothrix subtilis Kütz. Phyc. German. 197; Rabenh. Flor. Europ. Algar. iii. 365.

HUILLA.—Frequens in pascuis pluv. autumnalibus frequentius inundatis, demum exsiccantibus ad lacum magnum de Ivantala, inter *Porphyrosiphonem Notarisii*; March 1860. No. **18**.

PUNGO ANDONGO.—In pascuis spongiosis breve graminosis juxta rupes gig. Præsidii pr. Catete; May 1857. No. **111**.

Var. **variabilis** Kirchn. in Cohn, Kryptog.-Flora von Schles. 77 (1878); W. et G. S. West, *l.c.*.

Ulothrix variabilis Kütz. Species Algar. 346; Rabenh., *l.c.*

PUNGO ANDONGO.—Freq. temp. pluv. in summis rupib. Præsidii; Feb. 1857. No. **6**.

2. **STIGEOCLONIUM** Kütz (1843).

1. **Stigeoclonii?** sp. W. et G. S. West, *l.c.*

HUILLA.—Fragments amongst *Gonatonema tropicum*, etc., Morro de Lopollo; Feb. 1860. Nos. **172** and **186**.

3. **PSEPHOTAXUS** W. et G. S. West in Journ. Bot. 1897, p. 33.

1. **P. lamellosus** W. et G. S. West, *l.c.*

PUNGO ANDONGO.—Alga epiphytica in *Dichotriche gypsophila* (inter *Scytonema Myochrous* var. *chorographicum* et *Œdogonium tapeinosporum* var. *angolense*) ad latera boreal. et occid. de Pedra Songue; April 1857. No. **12**.

HUILLA.—In *Schizotriche natante* in graminosis paludosis juxta rivulum de Lopollo: April 1860. No. **180**.

This is a most remarkable confervaceous alga, more especially on account of its short filaments of irregular cells with thick lamellose walls; the filaments are enclosed in an irregular mucus which seems to be formed from the outer lamellæ of the cells. One method of

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propagation is by the breaking up of the filaments into their component cells, each of which by division then forms a short irregular filament.

4. **CONFERVA** L. (1737); em. Lagerh. (1887).

1. **C. bombycina** Ag. Syst. Algar. 88; Wille in Ofv. K. Vet.-Akad. Förhandl. (1881), no. 8, 20–1.

Forma minor Wille, *l.c.*, 21, t. i. fig. 36–40, t. ii. fig. 55, 56 (1881); W. et G. S. West in Journ. Bot. 1897, p. 34.

PUNGO ANDONGO.—Ad ramulos Podostemacearum in rivulis Præsidii (Casalalé); March 1857. No. **105**.

2. **C. sandwicensis** Ag. Syst. Algar. 92 (1824); Nordst. Alg. et Char. Sandwic. 18, t. i. fig. 25; W. et G. S. West in Journ. Bot. 1897, p. 34.

MOSSAMEDES.—Freq. in stagnis puris ad ripas flum. Bero, inter *Œdogonii* sp.; Aug. 1859. No. **190**.

5. **MICROSPORA** Thur. (1850); em. Lagerh. (1887).

1. **M. amœna** Rabenh. Fl. Europ. Algar. iii. 321 (1868); W. et G. S. West in Journ. Bot. 1897, p. 34.

Conferva amœna Kütz. Species Algar. 372 (1849).

GOLUNGO ALTO.—Ad rupes in flumine Luinha fluctuans; July 1856. No. **203**.

2. **M. Wittrockii** Lagerh. in Bericht. Deutsch. Bot. Gesellsch. v. 417 (1887); W. et G. S. West in Journ. Bot. 1897, p. 34.

Conferva Wittrockii Wille in Ofv. K. Vet.-Akad. Förhandl. (1881), no. 8, 20, t. i. fig. 1–11.

GOLUNGO ALTO.—In stagnis parvis circa Fonte da Bança de Quilombo Quiacatubia, ast sparsim; Jan. 1855. No. **202**.

3. **M. abbreviata** Lagerh., *l.c.*, 417 (1888); W. et G. S. West in Journ. Bot. 1897, p. 34.

Conferva abbreviata Rabenh. Krypt. Flor. v. Sachs. 246 (1863); Flor. Europ. Algar. iii. 323.

HUILLA.—Alga lætissime viridis, lubrica, nebulosa, ad *Batrachospermum huillense* in rivulis prope Lopollo; May 1860. Nos. **187** and **4**.

4. **M. Löfgrenii** Nordst. in Botaniska Notiser, 1882, 55; W. et G. S. West in Journ. Bot. 1897, p. 34.

Conferva Löfgrenii Nordst. in Wittr. & Nordst. Alg. aq. dulc. exsicc. No. 421 (1882).

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. **15**. Etiam Morro de Lopollo; May 1860. No. **182**.

Most of the plants had formed or were forming hypnospores, which when fully mature were globose or subglobose, with very thick lamellose walls; a few of these had evidently been formed from but part of the contents of a cell, and were externally nodulose. The cells had a very lamellose membrane, which character is most conspicuous during the formation of the hypnospores, the filaments

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becoming at this period more or less irregular, and the cell-septa also growing very greatly in thickness by the addition of lamellæ on each side. The filaments do not appear to break up in the manner of other species of *Microspora* and *Conferva*.

5. **M. fontinalis** De Toni, Syll. Alg. 230 (1899); W. et G. S. West in Journ. Bot. 1897, p. 34.

Conferva fontinalis Berk. Glean. t. xiv. fig. 1. A variety agreeing with var. *ochracea* Zanard. in the relative length of its cells, but occurring in dark green masses.

LOANDA.—In aquis puris stagnantibus subsalsis urbis Loandæ; June 1858. No. **198**. Also drawn up from the bottom of the pit at Welwitsch's house in Loanda, a well which hardly receives the light of day through a narrow slit in the cover; April 1859. No. **145**.

VI. CHROOLEPIDACEÆ.

1. **TRENTEPOHLIA** Mart. (1817).

1. **T. lagenifera** Wille, in Pringsh. Jahrb. xviii. 427 (1887); W. et G. S. West in Journ. Bot. 1897, p. 35.

Chroolepus lageniferum Hildebr. in Bot. Zeit. 85, t. iii. (1861).

GOLUNGO ALTO.—Inter *Scytonema insigne* ad rupes rivul. Coango-humect.; June 1856. No. **140**.

2. **T. phyllophila** W. et G. S. West in Journ. Bot. 1897, p. 35.

GOLUNGO ALTO.—Ad folia plantæ acaulis monocotyl. (*Dracæna monostachya* Baker [confer Herb. Welw. No. 3747]) in Mata de Quisucula, prope Bango; July 1857. No. **148**.

The green contents entirely fill the cells when living, but when dry they contract into a double-cone-shaped or dumb-bell-shaped mass in each cell. The branches rarely bear branchlets, except very short ones consisting of one or two cells. The species which most nearly approaches it is *T. tenuis* (Zell.) De Toni, from which it differs in its green colour, in its rather smaller size, in the equal thickness of its primary filaments and branches, and in its obovate zoogonidangia.

Forma subnana, fuscescens, cellulis paullo tumidis; crass. fil. 5–6 μ. (*l.c.*).

GOLUNGO ALTO.—Ad muscorum surculos (*Calyptothecium*) in rupibus juxta rivulos de Zengas do Queta; July 1856. No. **143**.

VII. CLADOPHORACEÆ.

1. **RHIZOCLONIUM** Kütz. (1843).

1. **R. crassipellitum** W. et G. S. West in Journ. Bot. 1897, p. 35.

LOANDA.—In terra humida umbrosa locis cultis; with cultivated plants in earthenware pots (em vasos de barra) at Museque Lopes in the island of Loanda, Aug. 1858. No. **205**.

This species is characterised by its terrestrial habit, its very thick cell-walls, and the absence of rhizoids.

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2. **CLADOPHORA** Kütz. (1843).

1. **C. crispata** (Roth) Kütz. Phyc. Gener. 264 (1843); Cooke, Brit. Freshw. Alg. 143, t. 55, fig. 3; W. et G. S. West in Journ. Bot. 1897, p. 36.

A form with the filaments not more than 1 to 1½ cm. high; branching subdichotomous, subsecund towards the apex; cells 6–12 times longer than broad.

LOANDA.—From the bottom of the well at Welwitsch's house in Loanda; Jan. 1859. No. **144**.

2. **C. amplectens** Welw. ex W. et G. S. West in Journ. Bot. 1897, p. 36.

LOANDA.—Ad imam basin truncorum *Rhizophorarum* tempore refluxus oceani aëri expositarum ad littora Loandensia frequens; Nov. 1853. No. **23**.

This species belongs to the section *Œgagropila*, and has rather a peculiar habit; Welwitsch likens the appearance of a tuft to that of a child's head.

3. **Cladophoræ** sp.

A minute fragment, insufficient for accurate determination; filaments about 1·5 mm. in length, branched repeatedly and irregularly; cells 1½ to 3 times as long as broad, mostly somewhat inflated, terminal cells acutely conical. Crass. cell. 33 to 56 μ. *l.c.*

PUNGO ANDONGO.—On Helices in Lagoa de Quibonda; Sept. 1857. No. **200**.

VIII. PITHOPHORACEÆ.

1. **PITHOPHORA** Wittr. (1877).

1. **P. radians** W. et G. S. West in Journ. Bot. 1897, p. 36.

LOANDA.—Copiose in aquariis aquæ subdulcis insulæ Cassanga prope Morro da Cruz; April 1854. No. **197**. "Stirps vegetationis suæ luxuria et vitæ fugacitate æque insignis."

The nearest species to this is *P. Œdogonia* (Mont.) Wittr., from which it differs in its much greater thickness, in having no branches of a third order, in never having binate spores, and in the intercalary spores being much less inflated.

IX. TEMNOGAMETACEÆ

W. et G. S. West in Journ. Bot. 1897, p. 37.

1. **TEMNOGAMETUM** W. et G. S. West, *l.c.*

1. **T. heterosporum** W. et G. S. West, *l.c.*

HUILLA.—Forming dense intricate masses with *Gonatonema tropicum*, *Zygnema spontaneum*, and *Stigeoclonium*? sp., Morro de Lopollo; Feb. 1860. No. **172**.

This is a remarkable plant more particularly on account of its special conjugating cells; these are short, and cut off either singly or in pairs at intervals along the filaments. In the former case the conjugation is scalariform; these special cells in two contiguous

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filaments put out short rounded conjugating tubes which unite, the cells themselves becoming bent towards each other, and very soon the two cells coalesce and form the zygospore. In this way a zygospore is produced which at first sight very much resembles the central cell of the five cells constituting the spore of a *Mougeotia* of the section *Staurospermeæ*. In those filaments in which the pairs of cells are cut off the conjugation is lateral, the two cells forming a zygospore much resembling the aplanospore of a *Gonatonema*. In fact, these zygospores are oblique, and the convexities and concavities alternate along the filament precisely as in the case of a sporiferous filament of the latter genus.

Both scalariform and lateral conjugation occur in the same filaments. In all the specimens observed (which had been dry for a long period) the contents of the thick-walled spores appeared to have contracted into two approximate rounded masses; whether the latter had ever been perfectly united or had yet to unite within the wall of the spore is a matter that could not be definitely decided from the material.

On account of the peculiar conjugation, this plant has been placed as the type of a new order—*Temnogametaceæ*—of *Conjugatæ*.

X. ZYGNEMACEÆ.

1. **MOUGEOTIA** Ag. (1824); em. Wittr. (1878).

1. **M.** (§ **Staurospermum**) **uberosperma** W. et G. S. West in Journ. Bot. 1897, p. 37.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176.**

This characteristic species belongs to the section *Staurospermum*; in maturely conjugated specimens this can only be inferred from the genuflexed conjugating cells, but the young zygospores are subrectangular or subquadrate. The four processes present on the zygospores are developed very early, considerably before the zygospores are ripe, and are rarely of equal length; they are of the same diameter as the vegetative cells, and fit into them very closely.

2. **M.** (§ **Staurospermum**) **irregularis** W. et G. S. West in Journ. Bot. 1897, p. 38.

PUNGO ANDONGO.—In pascuis spongiosis breviter graminosis juxta rupes gigant. Præsidii prope Catete; May 1857. No. **111.**

The nearest species to this is *M. capucina* (Bory) Ag., from which it is distinguished by its size, its colour, and its curious zygospores.

3. **M.** (§ **Craterospermum**) **angolensis** W. et G. S. West in Journ. Bot. 1897, p. 38.

PUNGO ANDONGO.—Ad ramulos Podostemacearum (*Tristicha trifaria* Tul.) in rivulis Præsidii (Casalalé), inter *Œdogonii Rothii* f. *majorem*; March 1857. No. **105.**

This species differs from *M. lætevirens* (A. Br.) Wittr. chiefly in the chromatophores each possessing a much fewer number of pyrenoids, and in the much smaller zygospores.

4. **Mougeotiæ** sp. W. et G. S. West, *l.c.*

HUILLA.—Ad culmos *Eleocharidis* fluitantis in rivulis de Morro de Lopollo (5300 ped. altit.); Feb. 1860. No. **188.**

MOSSAMEDES.—Freq. in stagnis puris ad ripas flum. Bero; Aug. 1859. No. **190.**

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5. **Mougeotiæ** sp., *l.c.*

HUILLA.—Inter *Utriculariam cymbantham*, Morro de Lopollo ; April 1860. No. **179.**

Conjugation incomplete ; conjugating cells much bent.

2. **GONATONEMA** Wittr. (1878).

1. **G. tropicum** W. et G. S. West in Journ. Bot. 1897, p. 38.

HUILLA.—Alga læte viridis, lubrica ad rupes submersas de Morro de Lopollo ; Feb. 1860. No. **186.** Inter *Temnogametum heterosporum*, Morro de Lopollo ; Feb. 1860. No. **172.** In paludibus exsiccandis ; April 1860. No. **176.** Inter *Microsporam Löfgrenii*, Morro de Lopollo ; May 1860. No. **182.**

This is a most characteristic species ; spores with processes of this nature are possessed only by two other algæ in the order *Zygnemaceæ*, viz. *Mougeotia uberosperma* and *M. irregularis*. The consecutive spores, which are very large, are alternately oblique, the cells containing them being very slightly bent alternately to the right and left.

3. **PYXISPORA** W. et G. S. West in Journ. Bot. 1897, p. 39.

1. **P. mirabilis** W. et G. S. West, *l.c.*

HUILLA.—In paludibus exsiccandis ; April 1860. No. **176.**

The fact that only a portion of the contents of the conjugating cells participates in the formation of the zygospore indicates a relationship to the fam. *Mesocarpeæ*, although the arrangement of the chromatophores in the ordinary vegetative cells much resembles the arrangement in the genus *Zygnema* (fam. *Zygnemeæ*). The character of the zygospores is, however, quite unique, and the plant has therefore been placed in a new family, *Pyxisporeæ*.

4. **ZYGNEMA** Ag. (1824).

1. **Z. ericetorum** Hansg. in Archiv. Naturw. Landesdurchf. von Böhmen, Bd. vi. 155–6 (1888) ; W. et G. S. West in Journ. Bot. 1897, p. 39.

Zygogonium ericetorum Kütz. Phyc. Gener. 280 (1843).

PUNGO ANDONGO.—Inter *Œdogonii* sp. ad limum juxta rivulum de Casalalé ipsius Præsidii ; Feb. 1857. No. **106.** Inter *Œdogonii Rothii* f. *majorem* ad ramulos Podostemacearum in rivulis Præsidii (Casalalé) ; March 1857. No. **105.** Ad Podostemaceas (*Tristicha trifaria* Tul.) in riv. de Cabondo ; Feb. 1857. No. **108.**

HUILLA.—In udis sylvaticis et apricis inter Monino et lac. Ivantala ; April 1860. No. **14.** In paludibus exsiccandis ; April 1860. No. **176.**

2. **Z. spontaneum** Nordst. Alg. et Char. Sandvic. 17, t. i. f. 23–24 (1878) ; W. et G. S. West in Journ. Bot. 1897, p. 40.

HUILLA.—Inter *Gonatonema tropicum*, *Temnogametum heterosporum*, etc., Morro de Lopollo ; Feb. 1860. No. **172.**

This most interesting species has very remarkable spores both with regard to their colour and markings. The original specimens from the Sandwich Islands described by Dr. Nordstedt had only aplanospores (hence the specific name) ; the African specimens have only zygospores. The relationship between the aplanospores and zygospores in this species is in all respects comparable to that between those of *Z. pachydermum* West ; in the latter species the aplanospores are also smaller, globose, and possess a thinner membrane.

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3. **Zygnematis** sp. W. et G. S. West, *l.c.*

PUNGO ANDONGO.—Cum *Scytonemate* in Pedra Songue; April 1857. No. **153**.

5. **SPIROGYRA** Link (1820).

1. **Spirogyræ** sp. W. et G. S. West in Journ. Bot. 1897, p. 40.

HUILLA.—Inter alias algas in uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**. Not in sufficient quantity for absolute specific determination.

2. **Spirogyræ** sp. W. et G. S. West, *l.c.*

PUNGO ANDONGO.—Inter *Batrachospermum nigrescens* in flum. Cuanza; March 1857. No. **104**. Ad rupes humidas juxta flum. Cuanza; March 1857. No. **156**.

GOLUNGO ALTO. Freq. in semistagnantibus ad ripas Rivi Quiapoze, Caminho (road) para Mussengue; Sept. 1855. No. **207**.

3. **Spirogyræ** sp. W. et G. S. West, *l.c.*

PUNGO ANDONGO.—Ad ramulos Podostemacearum (Tristicha) in rivulis Præsidii; March 1857. No. **109**. Nothing can be made out of the specimens with any precision.

4. **S. neglecta** Kütz. Species Algar. 441 (1849); Rabenh. Fl. Europ. Algar. iii. 248; Petit, Spirog. de Paris, 26, t. ix. f. 1–5.

Zygnema neglecta Hass. Brit. Freshw. Alg. 142, t. 23, f. 1–2 (1845).

Var. **ternata** W. et G. S. West in Journ. Bot. 1897, p. 41.

S. ternata Ripart in Bull. Soc. Bot. Fr. xxiii. 162 (1876); Petit, *l.c.*, 26, t. viii. f. 4–7.

HUILLA.—Frequentissima post pluv. autumnal. ad margines rivulorum prope Lopollo; April 1860. No. **185**.

5. **Spirogyræ** sp. W. et G. S. West, *l.c.*

PUNGO ANDONGO.—Inter *Batrachospermum nigrescens* in riv. Cuanza; March 1857. No. **104**.

6. **S. angolensis** Welw. ex W. et G. S. West in Journ. Bot. 1897, p. 41.

LOANDA.—Cum *Microspora fontinali* in aquis stagnorum puris (Cazimba) urbis Loanda; June 1858. No. **124**. In stagnis artificialibus (Represa de Manuel Pereira van Huñen) circa Loandam; July 1854. No. **193**. Etiam No. **103**.

The very dark-coloured conjugating filaments and the form of the zygospores characterise this species. *S. arcta* (Ag.) Kütz., to which No. 193 was referred by Welwitsch, is a much smaller plant with but one chromatophore, and the conjugating filaments are not dark-coloured.

7. **S. Welwitschii** W. et G. S. West in Journ. Bot. 1897, p. 41.

LOANDA.—Sp. denso agmine crescens, nubecularum amœniss. virid. ad instar aquis innatans; in stagnis artificialibus circa Loandam (Represa de M. Pereira van Huñen) c. *S. angolensi* Welw.; July 1854. No. **103**.

This species approaches *S. decimina* (Müll.) Kütz. (to which Welwitsch had referred it) and *S. neglecta* (Hass.) Kütz.; it differs from the former in its much greater thickness, shorter cells, and

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larger zygospores; from the latter in its somewhat thicker filaments, shorter cells, the character of its chromatophores, and in its shorter zygospores.

The following may belong to this species :—

PUNGO ANDONGO.—Cellulæ vegetativæ diametro (63–82 μ) 1½–2½-plo longioribus, extremitatibus non replicatis; chromatophoris 3 (?), magnis cum marginibus serratis et pyrenoidibus magnis. In stagnis ad latera rivulorum (Casalalé); Feb. 1857. No. **206** (*l.c.*, p. 42).

8. **Spirogyræ** sp., *l.c.*

LOANDA.—In Angolæ stagnis agri Loandensis, pr. Represa de M. Pereira; Feb. 1854. No. **125**.

9. **S. cylindrospora** W. et G. S. West in Journ. Bot. 1897, p. 42.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

The shortly cylindrical zygospores are very characteristic, fitting the cells like plugs pushed into them.

10. **Spirogyræ** sp., *l.c.*

GOLUNGO ALTO.—Freq. in semistagnantibus ad ripas rivi Quiapoze, Caminho (road) pr. Mussengue; Sept. 1855. No. **207**.

XI. DESMIDIACEÆ.

1. GONATOZYGON De Bary (1856).

1. **G. Ralfsii** De Bary, Conj. 76–7, t. iv. f. 23–25 (1858); W. et G. S. West in Journ. Bot. 1897, p. 77.

PUNGO ANDONGO.—Inter *Batrachospermum gracillimum*, ad lapides submersas in rivulo de Tangue ips. Præsidii; May 1857. No. **3**.

2. CYLINDROCYSTIS Menegh. (1838).

1. **C. crassa** De Bary, *l.c.*,74, t. vii. C (1858); W. et G. S. West in Journ. Bot. 1897, p. 77.

PUNGO ANDONGO.—Ad latera boreal. et occid. de Pedra Songue; April 1857. No. **12**.

3. PENIUM Bréb. (1846).

1. **P. oblongum** De Bary, *l.c.*, 73, t. vii. G, f. 1, 2 (1858); W. et G. S. West in Journ. Bot. 1897, p. 77.

GOLUNGO ALTO.—Ad margines stagnorum rivi Cuango; Aug. 1857. No. **155**.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Morro de Lopollo; Feb. 1860. No. **192**.

2. **Penii** sp.

Long. 28 μ; lat. 11·5 μ; this is probably *P. Mooreanum* Arch., but not seen in sufficient quantity for accurate identification (*l.c.*).

HUILLA.—Inter *Utriculariam cymbantham*, Morro de Lopollo; April 1860. No. **179**.

3. **Penii** sp.

Long. 26 μ; lat. 16 μ (*l.c.*).

HUILLA.—Prope lacum Ivantala; March 1860. No. **17**.

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4. **P. curtum** Bréb. in Kütz. Species Algarum, 167 (1849); W. et G. S. West in Journ. Bot. 1897, p. 77.

Closterium curtum Bréb. (1840); Kütz. (1845). *Cosmarium curtum* Ralfs, Brit. Desm. 109. t. xxxii. f. 9 (1848).

PUNGO ANDONGO.—In pascuis spongiosis breviter graminosis juxta rupes gigant. Præsidii pr. Catete; May 1857. No. **111**.

HUILLA.—Morro de Lopollo; Feb. 1860. No. **192**.

5. **P. adelochondrum** Elfv. in Acta Soc. Fauna et Flora Fenn. v. 2, no. 2, 17, t. i. f. 13 (1881); W. et G. S. West in Journ. Bot. 1897, p. 77.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. **15**.

6. **P. variolatum** W. et G. S. West in Journ. Bot. 1897, p. 77, t. 368, f. 23.

HUILLA.—Inter *Utricularíam cymbantham*, Morro de Lopollo; April 1860. No. **179**.

7. **P. minutum** Cleve in Ofv. K. Vet.-Akad. Förh. 1863, Arg. 20, no. 10, 493 (1864); W. et G. S. West in Journ. Bot. 1897, p. 78.

Docidium minutum Ralfs, Brit. Desm. 158, t. xxvi. f. 5 (1848). Cfr. *P. minutum* forma *genuina* West, in Journ. Linn. Soc. xxix. 129 (1892).

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**. In paludibus exsiccandis; April 1860. No. **176**. Inter *Utricularíam cymbantham*, Morro de Lopollo; April 1860. No. **179**. In graminosis paludosis juxta rivulum de Lopollo; April 1860. No. **180**.

Forma minor Racib. in Pamietnik Akad. Umiej. w Krakowie, Wydz. matem.-prz. x. (60–1), (1885); W. et G. S. West in Journ. Bot. 1897, p. 78.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**. In paludibus exsiccandis; April 1860. No. **176**.

Var. **gracile** Wille in Vid.-Selsk. Forhandl. Christiania, No. 11, 51, t. ii. f. 33 (1880); W. et G. S. West in Journ. Bot. 1897, p. 78.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Morro de Lopollo. No. **179**.

Var. **crassum** West in Journ. Linn. Soc. xxix. (1892), p. 130, t. xx. f. 1; W. et G. S. West in Journ. Bot. 1897, p. 78.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**. Morro de Lopollo; May 1860. No. **182**.

4. **CLOSTERIUM** Nitzsch (1817).

1. **C. pusillum** Hantzsch in Rabenh. Alg. Eur. no. 1008 (1861); Rabenh. Fl. Europ. Algar. iii. 125 (1868).

Var. **subrectum** W. et G. S. West in Journ. Bot. 1897, p. 78, t. 368, f. 24.

PUNGO ANDONGO.—Inter *Scytonema Myochrous* v. *chorographicum* et *Dichotrichem gypsophilam* ad latera boreal. et occid. de Pedra Songue; April 1857. No. **12**.

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2. **C. peracerosum** Gay, Essai Monogr. Conj. 75, t. ii. f. 18 (1883); Bull. Soc. Bot. Fr. xxxi. 339 (1884).

Var. **æthiopicum** W. et G. S. West in Journ. Bot. 1897, p. 78, t. 365, f. 9.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

3. **C. acerosum** Ehrenb. Abhandl. Akad. Wissenschaft. Berlin (1831), 68 (1832); Ralfs, Brit. Desm. 164, t. xxvii. f. 2.

Vibrio acerosus Schrank.

Var. **angolense** W. et G. S. West in Journ. Bot. 1897, p. 79.

GOLUNGO ALTO.—Ad margines stagnorum rivi Cuango; Aug. 1857. No. **155**.

4. **C. turgidum** Ehrenb. Infus. 95, t. 6, f. 7 (1838); Ralfs, *l.c.*, 165, t. xxvii. f. 3 (1848); W. et G. S. West in Journ. Bot. 1897, p. 79.

A shorter form than the typical one.

MOSSAMEDES.—In stagnis exsiccatis ad ripas flum. Bero; June 1859. No. **171**.

5. **C. Leibleinii** Kütz. in Linnæa, viii. 596, t. xviii. f. 79 (1833); Ralfs, *l.c.*, 167–8, t. xxviii. f. 4 (1848); W. et G. S. West in Journ. Bot. 1897, p. 79.

Two forms:—

LOANDA.—In stagnis (Represa de Luiz Gomes); Feb. 1858. No. **136**. Lat. 38 μ.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**. Lat. 22 μ.

6. **C. regulare** Bréb. in Mém. Soc. Imp. Sciences, Cherbourg, iv. 148–9, 304, t. ii. f. 35 (1856).

Forma minor W. et G. S. West in Journ. Bot. 1897, p. 79.

HUILLA.—Cum *Nitellæ* sp. in stagnis pr. Catumba; April 1860. No. **189**.

Some algologists appear to confuse this plant with *C. costatum* Corda; it is, however, very distinct from it.

5. **DOCIDIUM** Bréb. (1844).

1. **D. trigeminiferum** W. et G. S. West in Journ. Bot. 1897, p. 79, t. 368, f. 32–34.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Etiam inter *Utriculariam cymbantham*, Morro de Lopollo; April 1860. No. **179**.

This species is readily distinguished from *D. baculum* Bréb. by the much slighter basal inflation with no constriction above it, and by the different basal granules.

6. **PLEUROTÆNIUM** Näg. (1849).

1. **P. sparsipunctatum** W. et G. S. West in Journ. Bot. 1897, p. 79, t. 365, f. 10.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

This species can be compared with *P. subcoronulatum* (W. B. Turn.) West, and *P. conjunctum* (W. B. Turn.).

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2. **P. Ehrenbergii** De Bary, Conj. 75 (1858).

Docidium Ehrenbergii Bréb. (1844); Ralfs, Brit. Desm. 157, t. xxvi. f. 4 (1848); W. et G. S. West in Journ. Bot. 1897, p. 80.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

3. **P. maximum** Lund. in Acta R. Soc. Scient. Ups. ser. 3, viii. no. ii. 89 (1871); W. et G. S. West in Journ. Bot. 1897, p. 80.

Docidium maximum Reinsch in Abhandl. Senckenb. Naturforsch. Gesellsch. vi. 140, t. xx. C ii. f. 1–2 (1866–7); in Abhandl. Naturhist. Gesellsch. zu Nürnberg, iii. 184, t. xii. f. 4 (1866).

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

The shorter semicells (which are sometimes only 175 μ in length) have only one basal inflation; the longer ones have two.

7. **ICHTHYOCERCUS** W. et G. S. West in Journ. Bot. 1897, p. 80.

1. **I. angolensis** W. et G. S. West, *l.c.*, t. 368, f. 26–31.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. **15**. In graminosis paludosis juxta rivulum de Lopollo; April 1860. No. **180**. Morro de Lopollo; May 1860. No. **182**.

This genus seems to be near *Tetmemorus* and *Euastrum*. It resembles the former in its elongate form, in being but slightly constricted in the middle, and in possessing a circular (or very nearly circular) vertical view; it differs from it, however, in the absence of the deep linear notch at the apex, in the presence of a spine at each apical angle, and in the general conformation of the upper half of the semicells, which are somewhat wedge-shaped, with convex surfaces. From *Euastrum* it differs in its very slight constriction, its more parallel sides in front view, and in its circular vertical view.

The cell membrane appears to be much less firm than that of a *Tetmemorus*. The punctulations on it are in some specimens dense and in others distant from each other, and occasionally they are so well developed at the apical angles as to give them a faintly rough appearance. In one example the spine at one of the apical angles was duplicated, the two spines being placed close together, and of different lengths.

It also approaches the genus *Triploceros*, but the delicate character of the membrane, which is also destitute of warts, and the somewhat different apex distinguish it.

8. **TETMEMORUS** Ralfs (1844).

1. **T. granulatus** Ralfs in Ann. Mag. Nat. Hist. xiv. 257, t. viii. f. 2 (1844); Brit. Desm. 147, t. xxiv. f. 2, t. xxxiii. f. 1 (1848); W. et G. S. West in Journ. Bot. 1897, p. 81.

Closterium granulatum Bréb. (1839).

HUILLA.—Inter *Utriculariam cymbantham*, Morro de Lopollo; April 1860. No. **179**.

2. **T. lævis** Ralfs, Brit. Desm. 146, t. xxiv. f. 3 (1848).

Closterium lævе Kütz. Phyc. Germ. 132 (1845).

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Var **continuus** Nordst. Alg. Sandvic. 10 (1878); W. et G. S. West, *l.c.*

HUILLA.—In paludibus exsiccandis; April 1860. No. **176.**

3. **T. fissus** W. et G. S. West in Journ. Bot. 1897, p. 81, t. 368, f. 25.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176.**

This small species has somewhat unique characters that readily distinguish it from the other species of the genus.

9. **EUASTRUM** Ehrenb. (1832).

1. **E. acmon** W. et G. S. West in Journ. Bot. 1897, p. 81, t. 366, f. 11, 12.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utricullariis constituens; May 1860. No. **15.**

The front view of this species is considerably different from that of *E. intermedium* Cleve, a depressed form of which it somewhat resembles at first sight, and the vertical and lateral views readily distinguish it from all *Euastra* of this class.

Var. **clausum** W. et G. S. West, *l.c.*, p. 82, t. 366, f. 13.

HUILLA.—In graminosis paludosis juxta rivulum de Lopollo; April 1860. No. **180.**

2. **E. holoscherum** W. et G. S. West in Journ. Bot. 1897, p. 82, t. 366, f. 14.

HUILLA.—Inter *Microsporam abbreviatam* et *Batrachospermum huillense*, in rivulis prope Lopollo; May 1860. No. **187.**

3. **E. ansatum** Ehrenb. Abhandl. Akad. Wissenschaft. Berlin (1831), 82 (1832); Infus. 162, t. xii. f. vi. 2 (1838); Ralfs, Brit. Desm. 85, t. xiv. f. 2; W. et G. S. West, *l.c.*

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177.**

4. **E. huillense** W. et G. S. West in Journ. Bot. 1897, p. 82, t. 366, f. 15, 16.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15.** Etiam in paludibus exsiccandis; April 1860. No. **176.**

E. ansatum Ehrenb. var. *turgidum* Bœrg. (in Vidensk. Medd. Naturh. Foren. Kjöben. (1890), 33, t. iii. f. 15) is somewhat near this species in outline, but its dimensions and other characters are very different.

5. **E. sinuosum** Lenorm. (1845); Ralfs, *l.c.*, 85, t. xiii. f. 5 *a*, *b*, *c* (1848).

Var. **reductum** W. et G. S. West in Journ. Bot. 1897, p. 83.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15.** Morro de Lopollo; May 1860. No. **182.**

6. **E. hypochondrum** Nordst. in Acta Univers. Lund. xvi. no. iv. 8, t. i. f. 11 (1880); W. et G. S. West, *l.c.* A form with slightly

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different lateral lobes; this difference, however, may be owing to the specimens having been dried for a long period.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204.**

7. **E. hypochondroides** W. et G. S. West in Trans. Linn. Soc. 2 Ser. v. 49, t. vi. f. 8 (1895); in Journ. Bot. 1897, p. 83.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177.**

8. **E. subpersonatum** W. et G. S. West in Journ. Bot. 1897, p. 83, t. 366, f. 19.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177.**

This differs from *E. personatum* W. et G. S. West (in Trans. Linn. Soc. 2 Ser. v. 52-3, t. vi. f. 19) in having one median wart nearer the middle of the semicells and no accompanying scrobiculations, in the lateral lobes being widest in their upper portion, and in the wide gaping apical notch.

9. **E. elegans** Kütz. Phyc. Germ. 135 (1845); Ralfs, *l.c.*, 89, t. xiv. f. 7; W. et G. S. West in Journ. Bot. 1897, p. 83.

Heterocarpella elegans Bréb. (1839).

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15.**

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177.**

E. incurvatum W. B. Turn. (in K. Sv. Vet.-Akad. Handl. Bd. 25, No. 5, 83, t. xi. f. 1) and *E. annulatum* W. B. Turn. (*l.c.*, 80, t. x. f. 36, 52) seem to us to belong to *E. elegans*. Turner's drawing of the "lateral view" of *E. annulatum* (t. x. f. 52) shows that it is somewhat oblique, and not strictly a lateral view. The zygospore of *E. incurvatum* is also that of some forms of *E. elegans*.

10. **E. subinerme** W. et G. S. West in Journ. Bot. 1897, p. 84, t. 366, f. 18.

PUNGO ANDONGO.—In pascuis spongiosis breviter graminosis juxta rupes gig. Præsidii pr. Catete; May 1857. No. **111.**

This species is in outline very similar to *E. inerme* (Ralfs) Lund. (Nova Acta R. Soc. Scient. Ups. ser. 3, viii. no. ii. (1871), 20, t. ii. f. 3), but it is much smaller and shorter, has different basal angles, and also a very different arrangement of surface tumors. From *E. sinuosum* Lenorm. it differs in its much smaller size and its short rectangular polar lobe as seen in front view; from the vertical view the polar lobe is oblong-elliptical, and not sinuate-quadrate.

11. **E. erosum** Lund., *l.c.*, 22, t. ii. f. 6 (1871).

Forma minor W. et G. S. West in Journ. Bot. 1897, p. 84.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15.**

12. **E. cosmarioides** W. et G. S. West in Trans. Linn. Soc. 2 ser. v. 54, t. vi. f. 23 (1895).

Var. **curtum** W. et G. S. West in Journ. Bot. 1897, p. 84.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

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13. **E. binale** Ehrenb. in Bericht. Verh. Preuss. Akad. Wissensch. Berlin, 208–9 (1840); Ralfs, Brit. Desm. 90, t. xiv. f. 8 (1848).

Heterocarpella binalis Turp. (1820), *Cosmarium Aitchisonii* as figured by W. B. Turner in K. Sv. Vet. Akad. Handl. Bd. xxv. no. 5 (1893), t. viii. f. 54 *a*, *b* (*a* is oblique); non *C. Aitchisonii* Schaarschm. (1884).

Var **angolense** W. et G. S. West in Journ Bot. 1897, p. 84, t. 366. f. 8.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

14. **E. denticulatum** Gay in Bull. Soc. Bot. France, xxxi. 335 (1884); W. et G. S. West in Journ, Bot. 1897, p. 84.

E. binale v. *denticulatum* Kirchn. in Cohn, Kryptog. Flora Schlesien, 159 (1878).

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

Forma. A form with the lateral lobes partly subdivided; W. et G. S. West, *l.c.*, p. 85 (cf. W. et G. S. West in Trans. Linn. Soc. 2nd ser. v. t. ix. f. 16).

HUILLA.—Inter *Gonatonema tropicum*, Morro de Lopollo; Feb. 1860. No. **186**.

15. **E. tetragonum** W. et G. S. West in Journ. Bot. 1897, p. 85, t. 366, f. 10.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

Compare with *E. denticulatum* v. *rectangulare* W. et G. S. West in Trans. Linn. Soc. 2nd ser. v. 53, t. vi. f. 21.

16. **E. bimorsum** W. et G. S. West in Journ. Bot. 1897, p. 85, t. 366, f. 17.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. **15**.

This is very similar in outline to *E. Turnerii* West (in Journ. Linn. Soc. xxix. 141, t. xx. f. 18), but differs totally in both vertical and lateral views.

17. **E. subdivaricatum** W. et G. S. West in Journ. Bot. 1897, p. 85, t. 366, f. 9.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

This approaches *E. divaricatum* Lund. (in Nova Acta R. Soc. Scient. Ups. ser. 3, viii. (1871), no. ii. 21, t. ii. f. 5), but differs from it in its broader apex with a very shallow notch, its trilobed median wart, in the two quadrigranulate warts within the apex, and in the trigranulate wart within each basal angle, which latter feature causes the vertical view to be rectangular-oblong.

10. **MICRASTERIAS** Ag. (1827).

1. **M. arcuata** Bail. in Smithson. Contrib. ii. Art. 8, 37, t. i. f. 6 (1851); Nordst. in Ofvers. K. Vet.-Akad. Forh. no. 3 (1877), 22–23, ii. 1–2; W. et G. S. West in Journ. Bot. 1897, p. 86.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

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Var. **subpinnatifida** W. et G. S. West in Journ. Bot. 1897, p. 86, t. 366, f. 7.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Inter *Utriculariam cymbantham*, Morro de Lopollo; April 1860. No. **179**.

This variety appears to connect *M. arcuata* with *M. pinnatifida*; its lobes are thicker and more horizontal than in typical examples of the former, and the basal ones much resemble those of the latter. The lobes, however, are not so thick and have not the same form as those of *M. pinnatifida*, the apex of the polar lobe is retuse in the middle, and the lobes all possess that small terminal sharp spine characteristic of all specimens of *M. arcuata*.

2. **M. tropica** Nordst. in Vidensk. Medd. Naturh. Foren. Kjöben. 1869, no. 14–15, 219, t. ii. f. 15 (1870).

M. expansa var. γ: Wallich in Ann. Mag. Nat. Hist. ser. 3, v. 276–7, t. xiii. f. 9 (1860).

Forma. Apical processes almost horizontal, also with two large granules, one on each side of the extremity of each sinus; W. et G. S. West in Journ. Bot. 1897, p. 86, t. 366, f. 1.

HUILLA.—In paludibus exsiccandis; April 1860. No **176**.

This form has the four larger granules (or papillæ) possessed by var. *guianense* Racib. [in Flora (1895), lxxxi. 34, t. iii. f. 15], but has not the teeth at their apex.

Var. **elegans** W. et G. S. West, *l.c.*, t. 366, f. 2.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

Var. **crassum** W. et G. S. West in Journ. Bot. 1897, p. 87, t. 366, f. 3.

HUILLA.—Inter *Utriculariam cymbantham*, Morro de Lopollo; April 1860. No. **179**.

3. **M. robusta** W. et G. S. West in Journ. Bot. 1897, p. 87, t. 366, f. 5, 6.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

This beautiful and characteristic species has a very robust appearance on account of the shortness and thickness of the lobes; the subuncinate form of the lateral lobes is also peculiar.

4. **M. polonica** W. et G. S. West in Journ. Bot. xxxiii. 66 (1895); xxxv. p. 87 (1897).

M. Kitchelii Wolle, *forma polonica* B. Eichl. & Gutw. in Rospr. Akadem. Umiejet. Krakow. Wydz. matem.-prz. ser. ii. tom. viii. vol. xxviii. 173, t. v. f. 41 (1895).

HUILLA.—In editis de Morro de Lopollo; Feb. 1860. No. **192**.

The African form has a higher polar lobe than the Polish one, and the infra-apical incision is a little more open. Eichler & Gutwinski's measurement given in the text, "long. cell.=86 μ," is evidently a mistake, as their figure measures but 39 μ.

5. **M. crenata** Bréb. in Ralfs, Brit. Desm. 75, t. vii. f. 2 and t. x. f. 4 (1848); W. et G. S. West in Journ. Bot. 1897, p. 87. This plant is proportionately longer than *M. truncata* Bréb.; it has a more robust and deeper polar lobe, which is never retuse

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in the middle, though often flattened; it is also a very much rarer species.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**. Etiam inter *Gonatonema tropicum* et *Temnogametum heterosporum*, Morro de Lopollo; Feb. 1860. No. **172**.

11. **XANTHIDIUM** Ehrenb. (1834).

1. **X. fasciculatum** Ehrenb. Infus. 147-8, t. x. f. 24*b* (1838); Ralfs, Brit. Desm. 114–5; W. et G. S. West in Journ. Bot. 1897, p. 88, t. 368, f. 16.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

2. **X. cristatum** Bréb. in Ralfs, Brit. Desm. 115, t. xix. f. 3 (1848).

Var. **tropicum** W. et G. S. West in Journ. Bot. 1897, p. 88, t. 368, f. 15.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

In this variety there are two more spines on each semi-cell than in typical specimens of *X. cristatum*, and the semi-cells are of a somewhat different form; it may perhaps be another species.

3. **X. subtrilobum** W. et G. S. West in Journ. Bot. 1897, p. 88, t. 368, f. 14.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

It differs from *X. trilobum* Nordst. [in Vidensk. Medd. Naturh. Foren. 1869, no. 14–15, 230–1, t. iii. f. 35 (1870)], in being more distinctly trilobed with a rectangular sinus between the terminal and lateral lobes, in the lobes being more rectangular, in the presence of a spine in the middle of the outer margin of each lateral lobe, in the absence of crenulation at the inferior angles of the latter, in the rectangular polar lobe having but one spine at each angle (as seen in vertical view), and in the narrower vertical view with a more prominent central protuberance.

This species is closely allied to *X. calcarato-aculeatum* (*Holocanthum calcarato-aculeatum* Hieronymus in Engler, Pflanzenwelt Ost-Afrika, Theil C, 20 (1895)), described from the opposite side of the African continent at about the same latitude.

12. **COSMARIUM** Corda (1834).

1. **C. centrotaphridium** W. et G. S. West in Journ. Bot. 1897, p. 113, t. 367, f. 3–6.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. **15**.

The apex is subrectangular with a broad elevation at each angle, and another elevation in the centre, the latter not being as high as those at the angles. The four pairs of scrobiculations are somewhat variable (cf. loc. cit. t. 367, f. 4–6); sometimes there are three in place of either or both of the two central pairs.

2. **C. sublobatum** Arch. in Pritch. Infus. 731 (1861).

E. ? sublobatum Bréb. in Ralfs, Brit. Desm. 91, t. xxxii. f. 4 (1848).

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Var. **crispulum** De Toni, Syll. Alg. 1042; W. et G. S. West in Journ. Bot. 1897, p. 113.

Euastrum sublobatum Bréb. β. *crispulum* Nordst. in Acta Univ. Lund. ix. 10, t. i. f. 9 (1873). This variety is probably a *Euastrum*.

HUILLA.—Inter *Utriculariam*, Morro de Lopollo; April 1860. No. **179**. In paludibus exsiccandis; April 1860. No. **176**.

3. **C. retusiforme** Gutw. in Bot. Centralbl. xliii. 69 (1890); W. et G. S. West, *l.c.*

C. Hammeri Reinsch, var. *retusiforme* Wille in Vid.-Selsk. Forhandl., Christiania, no. 11, 32, t. 1, f. 16 (1880).

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

4. **C. retusum** Rabenh. Fl. Europ. Alg. iii. 167 (1868); W. et G. S. West, *l.c.*

Euastrum retusum Perty in Mittheil. Naturforsch. Gesellsch., Bern, 173 (1849); non Kütz. Phyc. Germ. 136 (1845).

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

5. **C. granatum** Bréb. in Ralfs, Brit. Desm. 96, t. xxxii. f. 6 (1848); W. et G. S. West, *l.c.*

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

We can now add West Central Africa to the distribution of this species, and this, along with its habitats in East Africa and Madagascar, still further confirms what Lagerheim has stated with regard to the cosmopolitan nature of the species.

6. **C. angustatum** Nordst. in Ofvers. K. Vet.-Akad. Förh. no. 6, 20 (1875); W. et G. S. West, *l.c.*, p. 114.

Euastrum binale var. *angustatum* Wittr. in Bih. t. K. Vet.-Akad. Handl. Bd. 1, no. 1, 50, t. iv. f. 8 (1872). *Euastrum polare* Nordst. in Ofv. K. Vet.-Akad. Förh. no. 6, 37, t. vii. f. 24 (1872). A form with the vertical view oblong.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

7. **C. maximum** W. et G. S. West in Journ. Bot. 1897, p. 114.

C. obsoletum (Hantzsch) Reinsch, subsp. *maximum* Börg. in Vidensk. Medd. Naturh. Foren. Kjöben., 1890, 42, t. iv. f. 37 (1891).

Var. **minor** W. et G. S. West in Journ Bot. 1897, p. 114, t. 367, f. 21.

HUILLA.—Inter *Utriculariam*, Morro de Lopollo; April 1860. No. **179**.

C. palustre W. B. Turn. (in K. Sv. Vet.-Akad. Handl. Bd. xxv. No. 5, 60–1, t. viii. f. 65 and t. ix. f. 1) has some resemblance to this species, but is proportionately broader, has a much broader isthmus like that of *C. obsoletum*, and the spines at the basal angles are strongly convergent.

8. **C. Lundellii** Delp. in Memor. Accad. Sci. Torino, ser. 2, xxx. 13, t. vii. f. 62-64 (1878).

C. subcirculare W. B. Turn. in K. Sv. Vet.-Akad. Handl. Bd. xxv. no. 5, 52, t. viii. f. 3 and t. ix. f. 27, 37 (1892).

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Var. **æthiopicum** W. et G. S. West in Journ Bot. 1897, p. 114.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

Forma scrobiculata W. et G. S. West, *l.c.*

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

9. **C. Baileyi** Wolle, Desm. U. S. 64, pl. xvi. f. 17, 18 (1884); W. et G. S. West, *l.c.*

C. depressum Bail., non (Näg.) Lund.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

Var. **angolense** W. et G. S. West in Journ. Bot. 1897, p. 114.

HUILLA.—Inter *Utricularian*, Morro de Lopollo; April 1860. No. **179**.

Compare with *C. Baileyi* v. *major* W. et G. S. West (in Trans. Linn. Soc. 2nd ser. v. 246, t. xiv. f. 36).

10. **C. pyramidatum** Bréb. in Ralfs, Brit. Desm. 94, t. xv. f. 4 *a*, *b*, *c* (1848).

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Etiam inter *Utricularian*, Morro de Lopollo; April 1860. No. **179**.

Forma tropica W. et G. S. West in Journ Bot. 1897, p. 115.

HUILLA.—Cum typ.; Nos. **176** and **179**.

Var. **parallelum** W. et G. S. West, *l.c.*

HUILLA.—In editis de Morro de Lopollo; Feb. 1860. No. **192**.

11. **C. pseudopyramidatum** Lund. in Nova Acta R. Soc. Scient. Ups. ser. 3, vol. viii. no. ii. 41, t. ii. f. 18 (1871); W. et G. S. West, *l.c.*

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

12. **C. ligoniforme** W. et G. S. West in Journ. Bot. 1897, p. 115, t. 367, f. 12.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15** (freq. c. zygosp.). Morro de Lopollo; April 1860. No. **182**.

This species closely resembles some forms of *C. pseudopyramidatum* Lund., but is comparatively broader with wider apices, has different basal angles, and the zygospore is very different.

13. **C. variolatum** Lund., *l.c.*, 41, t. ii. f. 19 (1871); W. et G. S. West in Journ. Bot. 1897, p. 115.

(*a.*) *Forma scrobiculis numerosioribus.*

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

GOLUNGO ALTO.—Inter *Scytonema Arcangelii* ad muscos prope fontem magn. ad Bança do Sobato de Bango; Sept. 1855. No. **159**.

(*b.*) *Forma semicellulis latioribus.*

HUILLA.—Morro de Lopollo; Feb. 1860. No. **192**.

14. **C. africanum** W. et G. S. West in Journ. Bot. 1897, p. 115, t. 368, f. 1.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Morro de Lopollo; Feb. 1860. No. **192**.

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This is somewhat like *C. nitidulum* De Not. in form, but the very thick and scrobiculate membrane easily distinguishes it.

15. **C. trifossum** W. et G. S. West in Journ. Bot. 1897, p 116, t. 367, f. 19.

HUILLA.—Inter *Utriculariam*, Morro de Lopollo; April 1860. No. **179**. In paludibus exsiccandis; April 1860. No. **176**. Etiam in graminosis paludosis juxta rivulum de Lopollo; April 1860. No. **180**.

The three shallow notches seen in the front view of each semicell are due to the presence of three grooves running at right angles to both the longitudinal and transverse axes.

16. **C. galeritum** Nordst. in Vidensk. Medd. Naturh. Foren. Kjöben. 1869, No. 14–15, 209–210, t. iii. f. 26 (1870); W. et G. S. West in Journ. Bot. 1897, p. 116.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

17. **C. nitidulum** Not. Desm. Ital. 42, t. iii. f. 26 (1867).

C. rectosporum W. B. Turn. in K. Sv. Vet.-Akad. Handl. Bd. 25, no. 5, 69, t. x. f. 16 (1893).

Var. **minor** W. et G. S. West, *l.c.*

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

18. **C. scenedesmus** Delp. in Memor. Accad. Sci. Torino, ser. 2, xxx. 5–6, t. vii. f. 28–34 (1878).

Var. **dorsitruncatum** Nordst. in K. Sv. Vet.-Akad. Handl. Bd. xxii. no. 8, 59, t. iii. f. 15 (1888); W. et G. S. West, *l.c.*

A small form with a perfectly smooth membrane.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

19. **C. æthiopicum** W. et G. S. West in Journ. Bot. 1897, p. 116, t. 367, f. 20.

PUNGO ANDONGO.—Inter *Scytonema Myochrous* v. *chorographicum* et *Dichotrichem gypsophilam* ad latera boreal. et occid. de Pedra Songue; April 1857. No. **12**.

HUILLA.—Inter *Porphyrosiphonem Notarisi* prope lacum Ivantala; March 1860. No. **17**.

In outline this species calls to mind *C. rectangulare* Grun. 1868 (= *C. Gotlandicum* Wittr. 1872), but the more angular semi-cells, the much broader isthmus, and the plications present on the upper half of the semi-cells, at once distinguish it.

20. **C. pseudoprotuberans** Kirchn. in Cohn, Kryptog.-flora von Schlesien, Zweit. Bd. 150 (1878); Nordst. in Ofv. K. Vet.-Akad. Forh. no. 3, 8, t. vii. f. 3 (1885); W. et G. S. West, *l.c.*, p. 117.

A small form agreeing with var. *pygmæum* Gutw. (Flora glonów okolic Lwowa, 54, t. ii. f. 9) in dimensions, but of the same form as the type.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

21. **C. polygonum** Arch. in Pritch. Infus. 732 (1861).

Euastrum polygonum Näg. Gatt. Einz. Alg. 120, t. 7A, f. 9 (1849).

Var. **exile** W. et G. S. West in Journ. Bot. 1897, p. 117.

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PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177.**

Compare with *C. polygonum* v. *minus* Hieronymus.

22. **C. ellipsoideum** Elfv. in Acta Soc. Fauna et Flora Fenn. ii. no. 2, 13, t. i f. 10 (1881).

Var. **minor** Racib. in Pamietnik Akad. Umiej. w Krakowie, Wydz. Matem.-prz. x. (84), t. x. f. 9 (1885); W. et G. S. West, *l.c.*

C. proteiforme W. B. Turn. in K. Sv. Vet.-Akad. Handl. Bd. xxv. no. 5, 64, t. ix. f. 26 (1892).

PUNGO ANDONGO —In stagnis prope Anbilla (Condo); March 1857. No. **177.**

23. **C. submamilliferum** W. et G. S. West in Journ. Bot. 1897, p. 117, t. 368, f. 8.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177.**

This is distinguished from *C. mamilliferum* Nordst. in Vidensk. Medd. Naturh. Foren. Kjöben. 1869, no. 14–15, 212, t. iii. f. 22 (1870) by the very different form of the semi-cells in front view.

24. **C. meteoronotum** W. et G. S. West in Journ. Bot. 1897, p. 117, t. 367, f. 18.

HUILLA.—In uligiuosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15.**

This differs from *C. sexangulare* Lund. (in Nova Acta R. Soc. Scient. Ups. ser. 3, vol. 8, no. ii. 35, t. ii. f. 23) in its larger size, its relatively greater length, and in its unequal hexagonal semi-cells.

25. **C. sulcatum** Nordst. Alg. Sandvic. 13, t. i. f. 18 (1878); W. et G. S. West, *l.c.*, p. 118.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177.**

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204.**

26. **C. heterochondrum** Nordst. in Acta Univers. Lund. xvi. p. 5, t. i. f. 3 (1880).

Var. **mediogemmatum** W. et G. S. West in Journ. Bot. 1900, p. 292.

C. mediogemmatum W. et G. S. West in *op. cit.* 1897, p. 118, t. 367, f. 11.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177.**

The lateral angles of this plant are usually finely granulate.

27. **C. sinostegos** Schaarschm. in Magyar. Tudom. Akad. Math. Természett. Közlemén. xviii. 266, tab. i. f. 12 (1883).

Var. **obtusius** Gutw. in Sprawozd. Komisyi fizyographic., Akad. Umiej. w. Krakowie, xxviii. pt. ii. 129, t. ii. f. 13 (1893); W. et G. S. West in Trans. Linn. Soc. ser. 2, v. 58, t. vi. f. 33 (1895); Journ. Bot. 1897, p. 118.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204.**

28. **C. emarginatum** W. et G. S. West in Trans. Linn. Soc. ser. 2, v. 58, t. viii. f. 14 (1895); Journ. Bot. 1897, p. 118.

A large form with a narrower isthmus.

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HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

29. **C. minimum** W. et G. S. West in Trans. Linn. Soc. 58, t. viii. f. 10 (1895); Journ. Bot. 1897, p. 118.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**. Morro de Lopollo; May 1860. No. **182**.

30. **C. exiguum** Arch. in Proc. Dubl. Nat. Hist. Soc. vol. iv. pt. i. 49-50, t. i. f. 32–33 (1864); Nordst. in K. Sv. Vet.-Akad. Handl. Bd 22, no. 8, 58, t. vi. f. 12 (1888); W. et G. S. West in Journ. Bot. 1897, p. 118.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

31. **C. norimbergense** Reinsch in Abhandl. Naturhistor. Gesellsch. Nürnberg, Bd. 3, 113, t. ix. f. 2 (1866).

C. Hammeri Reinsch, var. *octogibbosum* Reinsch, *l.c.*, 112, t. x. f. 1. *C. octogibbosum* W. B. Turn. in K. Sv. Vet.-Akad. Handl. Bd. 25, 52 (1892). *C. octogibbosum* var. *indica* W. B. Turn., *l.c.*, t. viii. f. 8.

Forma elongata W. et G. S. West in Journ. Bot. 1827, p. 119. *C. exiguum* Arch. var. *norimbergense* Schmidle in Flora, lxxviii. 56, t. vii. f. 17 (1894).

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. **179**. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

Forma depressa W. et G. S. West, *l.c.*

LOANDA.—In stagnis (Represa de Luiz Gomes); Feb. 1858. No. **136**.

32. **C. Meneghinii** Bréb. in Ralfs, Brit. Desm. 96, t. xv. f. 6 (1848); W. et G. S. West, *l.c.*

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

Small forms, but otherwise exactly agreeing with the figures in Ralfs (*l.c.*).

Var. **angulosum** Rabenh. Fl. Europ. Alg. iii. 163 (1868); W. et G. S. West, *l.c.*

C. angulosum Bréb. in Mém. Sciences Nat. Cherbourg, iv. 127, 303, t. i. f. 17 (1856).

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

PUNGO ANDONGO.—Ad ramulos Podostemacearum in rivulis Præsidii (Casalalé); March 1857. No. **105**.

Var. **simplicimum** Wille in Vid.-Selsk. Forhandl. Christiania, no. 11, 30, t. i. f. 11 (1880); W. et G. S. West *l.c.*

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

PUNGO ANDONGO.—Ad ramulos Podostemacearum in rivulis Præsidii (Casalalé); March 1857. No. **105**.

33. **C. læve** Rabenh. Fl. Europ. Alg. iii. 161 (1868); Nordst. in Ofv. K. Vet.-Akad. Förh. no. 6, 29, t. xii. f. 4 (1876).

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Var. **minimum** W. et G. S. West in Journ. Bot. 1897, p. 119, t. 368, f. 6.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo ; May 1860. No. **15**.

34. **C. subpyriforme** Lagerh. in Botan. Notiser, 1887, 197, c. fig. ; W. et G. S. West in Journ. Bot. 1897, p. 119. A very small form with rather broader bases to the semi-cells than the type ; other views not obtainable.

HUILLA.—Inter *Utricularian*, Morro de Lopollo ; April 1860. No. **179**.

35. **C. affine** Racib. in Rosprawy Akad. Umiej. Krakow. Wydzial. Mat.-przyr. ser. 2, t. ii. (vol. xxii.) 363, t. vi. f. 25 (1892).

Var. **africanum** W. et G. S. West in Journ. Bot. 1897, p. 120, t. 368, f. 7.

LIBONGO.—Ad margines flum. Lifune ; Sept. 1858. No. **204**.

36. **C. minutissimum** Arch. in Q. J. M. S. xvii. (new ser.) 194 et 301 (1877); Cooke, Brit. Desm. 91 ; W. et G. S. West in Journ. Bot. 1897, p. 120.

HUILLA.—Morro de Lopollo ; May 1860. No. **182**.

37. **C. galeatum** W. et G. S. West in Journ. Bot. 1897, p. 120, t. 368, f. 2, 3.

HUILLA.—Morro de Lopollo ; Feb. 1860. No. **192**.

The form of this species together with its small size and the presence of a tooth at each basal angle easily distinguish it.

38. **C. libongense** W. et G. S. West in Journ. Bot. 1897, p. 120, t. 368, f. 12.

LIBONGO.—Ad margines flum. Lifune ; Sept. 1858. No. **204**.

This differs from *C. subundulatum* Wille in its shorter cells, its truncate apices, its crenate lateral margins, its entire absence of granules, and in its different vertical and lateral views. From *C. subundulatum* var. *Beanlandii* West it differs in its crenate lateral margin, its more truncate apices, in the absence of granules, and in its different vertical view.

39. **C. repandum** Nordst. in Botan. Notiser, 1887, 162; in K. Sv. Vet.-Akad. Handl. Bd. 22, no. 8, 58, t. vi. f. 14 (1888); W. et G. S. West in Journ. Bot. 1897, p. 120, t. 368, f. 13. A form with the semi-cells a little dilated upwards.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

C. odontopleurum Arch. (in Roy et Biss. in Ann. Scott. Nat. Hist. (1894). 169, t. ii. f. 13) appears to be only a small form of *C. repandum* Nordst.

40. **C. multiordinatum** W. et G. S. West in Journ. Bot. 1897, p. 121, t. 367, f. 8.

PUNGO ANDONGO.—In stagnis prope Anbilla Condo) ; March 1857. No. **177**.

This is nearest to *C. decoratum* W. et G. S. West (in Trans. Linn.

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Soc. 2nd ser. v. 61, t. vii. f. 21), but it is easily distinguished by its shorter cells, its smaller size, its round (not triangular) scrobiculations surrounding the granules, as well as its wider apex.

This is the only species we know which has the two opposite sides of the hexagons of scrobiculations surrounding each granule, horizontally disposed.

41. **C. margaritatum** Roy & Biss. in Journ. Bot. xxiv. 194 (1886); Roy in Ann. Scott. Nat. Hist. 167, t. ii. f. 12 (1894).

C. latum Bréb. var. *margaritatum* Lund. in Nova Acta R. Soc. Scient. Ups. ser. 3, viii. 26 (1871).

Forma minor Boldt. in Bih. till Sv. Vet.-Akad. Handl. Bd. 13, Afd. 3, no. 5, 26 (1888); W. et G. S. West in Journ. Bot. 1897, p. 121.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

42. **C. Portianum** Arch. in Q. J. M. S. viii. 235–6, t. xi. f. 8, 9 (1860); in Pritch. Infus. 733 (1861); Rabenh. Fl. Europ. Alg. iii. 160 (1868).

Var. **orthostichum** Schmidle in Bericht. Deutsch. Bot. Ges. Bd. xi. Heft. 10, 549, t. xxviii. f. 7 (1893). *Forma minor* W. et G. S. West in Journ. Bot. 1897, p. 121, t. 368, f. 9.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

This approaches *C. nephroideum* Roy & Biss. (in Ann. Scott. Nat. Hist. 1894, 169, t. ii. f. 3), which seems to differ from *C. Portianum* var. *nephroideum* Wittr. both in its smaller size and in the regular arrangement of its granules.

43. **C. trachycyrtum** Reinsch, Contrib. Alg. et Fung. 83, t. xviii. f. 1 (1875); W. et G. S. West in Journ. Bot. 1897, p. 121.

HUILLA.—Inter *Porphyrosiphonem Notarisii* Kütz. in udis sylvaticis et apricis inter Monino et lac. Ivantala; April 1860. No. **14**.

44. **C. punctulatum** Bréb. in Mém. Soc. Sciences Nat. Cherbourg, iv. 129, 303, t. i. f. 16 (1856); Klebs in Schrift. phys.-ökon. Gesellsch. Königsberg, xx. 37, t. iii. f. 50, 51 (1879); W. et G. S. West *l.c.*

HUILLA.—In rivulis prope Lopollo; May 1860. No. **187**.

Var. **elongatum** Klebs, *l.c.*, t. iii. f. 53; W. et G. S. West in Journ. Bot. 1897, p. 122.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

45. **C. concentricum** W. B. Turn. in K. Sv. Vet.-Akad. Handl. Bd. 25, no. 5, 62, t. ix. f. 11 (1893).

Var. **radiatum** W. et G. S. West in Journ. Bot. 1897, p. 122, t. 368, f. 10.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

46. **C. Blyttii** Wille in Vid.-Selsk. Forhandl. Christiania, no. 11, 25, t. i. f. 7 (1880); W. et G. S. West in Journ. Bot. 1897, p. 122.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

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47. **C. subcostatum** Nordst. in Ofv. K. Vet.-Akad. Forh. no. 6, 37-8, t. xii. f. 13 (1876).

Forma minor W. et G. S. West in Journ. Bot. xxxiv. 379, t. 361, f. 15 (1896); xxxv. 122 (1897).

MOSSAMEDES.—Inter Charas in rivo Caroca pr. Cabo negro; Sept. 1859. No. **19**.

48. **C. alatum** Kirchn. in Cohn, Kryptogamen-flora von Schlesien, Zweit. Bd., 153 (1878); W. et G. S. West in Journ. Bot. 1897, p. 122.

LOANDA.—In stagnis (Represa de Luiz Gomes); Feb. 1858. No. **136**.
LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

Var. **suboblongum** W. et G. S. West in Journ. Bot. 1897, p. 122.

PUNGO ANDONGO.—Ad ramulos Podostemacearum in rivulis Præsidii (Casalalé); March 1857. No. **105**.

49. **C. subtriordinatum** W. et G. S. West in Journ. Bot. 1897, p. 122, t. 368, f. 11.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

The nearest species to this is *C. triordinatum* W. et G. S. West (in Trans. Linn. Soc. ser. 2, v. 66, t. vii. f. 27), from which it differs in its less wide cells, its rounded and not acute granules, its smooth apex, and in its quadrate (not rounded) and fewer central warts.

50. **C. callistum** W. et G. S. West in Journ. Bot. 1897, p. 172, t. 367, f. 13.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

51. **C. colonophorum** W. et G. S. West in Journ. Bot. 1897, p. 172, t. 367, f. 1.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

This is a noteworthy species, the large size of the warts and their arrangement easily distinguishing it from any other; the four median warts on each side of the vertical view being especially pronounced.

52. **C. bilunatum** W. et G. S. West in Journ. Bot. 1897, p. 173, t. 367, f. 17.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

This characteristic species is nearest in outline to *C. præcelsum* W. B. Turn. and *C. indicum* W. B. Turn.

53. **C. mucronatum** W. et G. S. West in Journ. Bot. 1897, p. 173, t. 367, f. 16.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Inter *Utricularium*, Morro de Lopollo; April 1860. No. **179**.

This species is distinguished from *C. pseudotaxichondrum* Nordst. by its rounded semi-cells, by the complete absence of granules, and by the oblong vertical view.

54. **C. pseudotaxichondrum** Nordst in Ofvers K. Vet.-Akad. Förh. no. 3, 20, t. ii. f. 5 (1877).

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Var. **africanum** W. et G. S. West in Journ. Bot. 1897, p. 173, t. 367, f. 14.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Inter *Utricularium*, Morro de Lopollo; April 1860. No. **179**.

55. **C. huillense** W. et G. S. West in Journ. Bot. 1897, p. 174, t. 367, f. 15.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

This differs from *C. taxichondrum* Lund. in having three groups of granules on each semi-cell, one across the front of each side of the semi-cell and one at the apex, in the more numerous and smaller granules, and in the presence of minute scrobiculations round these granules.

56. **C. angolense** W. et G. S. West in Journ. Bot. 1897, p. 174, t. 367, f. 7.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

The two series of spines in vertical view are concave towards each other.

57. **C. tetrastichum** W. et G. S. West in Journ. Bot. 1897, p. 174, t. 367, f. 9.

HUILLA.—Inter *Utricularium*, Morro de Lopollo; April 1860. No. **179**. Morro de Lopollo; Feb. 1860. No. **192**.

Var. **depauperatum** W. et G. S. West, *l.c.*, t. 367, f. 10.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

58. **C. subspeciosum** Nordst. in Ofv. af K. Vet.-Akad. Förh. no. 6, 22, t. vi. f. 13 (1875); W. et G. S. West, *l.c.*, p. 175.

A form which is most probably var. *validius* Nordst., but specimens not in a condition for the satisfactory determination of this point.

PUNGO ANDONGO.—In rivulis Præsidii (Casalalé); March 1857. No. **105**.

59. **C. Welwitschii** W. et G. S. West in Journ. Bot. 1897, p. 175, t. 367, f. 2.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Etiam inter *Utricularium*, Morro de Lopollo; April 1860. No. **179**.

This handsome species approaches *C. Lagerheimianum* W. et G. S. West, *l.c.* [*Dysphinctium Lagerheimianum* W. B. Turn. in K. Sv. Vet.-Akad. Handl. Bd. 25, no. 5 (1893), 43, t. xxii. f. 6], but differs greatly in its much deeper constriction, in its flattened apices, in the double series of emarginate warts, in the shorter conical warts (not elongated papillæ), and in the very densely scrobiculate membrane. In the vertical view the double series of emarginate warts are concave towards each other in the centre, and subparallel towards the poles.

60. **C. æquinoctiale** W. et G. S. West in Journ. Bot. 1897, p. 175, t. 365, f. 11.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

This is distinguished from *C. orbiculatum* Ralfs in its less orbicular semi-cells, its much broader isthmus, and in its smaller granules with definite arrangement. Compare also with *C. qualum* W. et G. S. West, *l.c.* [*Dysphinctium qualum* W. B. Turn.].

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61. **C. contractum** Kirchn. in Cohn, Kryptogamen-flora von Schles. Zweit. Bd. 147 (1878); Wolle, Desm. U. S. 63, t. 16, f. 1; t. 50, f. 24 (1884); W. et G. L. West, *l.c.*

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); **March** 1857. No. **177**.

62. **C. Oocystidum** W. et G. S. West in Journ. Bot. 1897, p. 175, t. 366, f. 21.

HUILLA.—Inter *Utricularium*, **Morro de Lopollo**; April 1860. No. **179**.

63. **C. Cucurbita** Bréb. in Desmaz. Pl. Cryptog. Fr. fasc. xxiii. 1103 (1841), in ed. i. ser. i. (1825-51); Ralfs, Brit. Desm. 108–9, t. xvii. f. 7 (1848); W. et G. S. West in Journ. Bot. 1897, p. 176.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Inter *Utricularium*, **Morro de Lopollo**; April 1860. No. **179**. **Morro de Lopollo**; Feb. 1860. No. **192**.

All the African examples are more densely and minutely punctate than the typical plant.

Forma minor W. et G. S. West, *l.c.*

HUILLA.—Cum forma typ. Nos. **176** and **179**.

Var. **minimum** W. et G. S. West, *l.c.*

HUILLA.—Cum forma typ. No. **179**.

64. **C. palangula** Bréb. in Ralfs, Brit. Desm. 212 (1848); W. et G. S. West, *l.c.*

HUILLA.—In uliginosis editoribus prope **Humpata, Empalanca** et Lopollo; May 1860. No. **15**.

13. **STAURASTRUM** Meyen (1829).

1. **S. leptodermum** Lund. in Nova Acta R. Soc. Scient. Ups. ser. 3, viii. no. ii. 58, t. iii. f. 26 (1871).

Forma minor W. et G. S. West, in Journ. Bot. 1897, p. 176.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

2. **S. tripodum** W. et G. S. West in Journ. Bot. 1897, p. 176, t. 369, f. 11.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

This species and *S. xiphidiophorum* Wolle are respectively simple and complex species of a distinct section of this genus.

3. **S. crux-alternans** W. et G. S. West in Journ. Bot. 1897, p. 176, t. 369, f. 14.

HUILLA.—Inter *Utricularium*, **Morro de Lopollo**; April 1860. No. **179**.

This at first sight reminds one of *S. inconspicuum* Nordst.; but it differs in its much more robust processes, which are directed horizontally, and have not the nodulose swelling on the under side.

4. **S. huillense** W. et G. S. West in Journ. Bot. 1897, p. 177, t. 368, f. 17.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

5. **S. egregium** W. et G. S. West in Journ. Bot. 1897, p. 177, t. 369, f. 12.

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HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**. Etiam Morro de Lopollo; May 1860. No. **182**.

This *Staurastrum* belongs to the same section as *S. quadricornutum* Roy & Biss. and *S. gemelliparum* Nordst., but is very distinct from either. Each of the three angles of the semi-cells is more or less quadrate with a short bifurcate process at the two upper corners, with an emarginate wart at each of the lower corners, and a short stout spine between the two emarginate warts.

6. **S. tridens-Neptuni** W. et G. S. West in Journ. Bot. 1897, p. 177, t. 369, f. 7.

HUILLA.—Freq. in paludibus exsiccandis; April 1860. No. **176**. Etiam inter *Utricularium*, Morro de Lopollo; April 1860. No. **179**.

The nearest species to this is *S. subtrifurcatum* W. et G. S. West [in Trans. Linn. Soc. 2nd ser. v. 258–9, t. xvi. f. 24 (1896)], from which it is distinguished by the three diverging and somewhat shorter spines at each angle being situated in a vertical plane, and in the pentagonal vertical view with acute angles.

7. **S. pentateuchophorum** W. et G. S. West in Journ. Bot. 1897, p. 178, t. 369, f. 6.

HUILLA.—Freq. in paludibus exsiccandis; April 1860. No. **176**. Etiam freq. inter *Utricularium*, Morro de Lopollo; April 1860. No. **179**.

This species is somewhat allied to *S. tridens-Neptuni*, but is very distinct from it.

8. **S. heteroplophorum** W. et G. S. West in Journ. Bot. 1897, p. 178, t. 369, f. 8.

HUILLA.—Freq. in paludibus exsiccandis; April 1860. No. **176**. Etiam inter *Utricularium*, Morro de Lopollo; April 1860. No. **179**.

The arrangement of the spines on the much narrower angles (as seen in vertical view) easily distinguishes this species from *S. Hystrix* Ralfs. At each angle there are two large spines in a vertical plane, and about six much smaller ones round them; the latter are sometimes regularly disposed in a circle round the two larger ones.

Var. **latum** W. et G. S. West in Journ. Bot. 1897, p. 178, t. 369, f. 9.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

9. **S. Pseudohystrix** W. et G. S. West in Journ. Bot. 1897, p. 178, t. 369, f. 10.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Etiam inter *Utricularium*, Morro de Lopollo; April 1860. No. **179**.

This species differs from *S. Hystrix* Ralfs in its smaller size, its more angular semicells, its fewer, longer, thinner, and curved spines which are confined to the face of the truncate angles.

10. **S. Welwitschii** W. et G. S. West in Journ. Bot. 1897, p. 179, t. 369, f. 1.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

This is a very characteristic species.

11. **S. Corbula** W. et G. S. West in Journ. Bot. 1897, p. 179, t. 369, f. 2.

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HUILLA.—In paludibus exsiccandis ; April 1860. No. **176.**

This species has about twenty-five very short spines on each of the three angles of a semi-cell, over which is placed a pair of slender, erect and longer spines. It most nearly approaches *S. Welwitschii* in form and arrangement of spines, but differs from it in being triangular in vertical view, and in having a pair of slender erect spines in place of the single stout spine of the latter species. The angles are also furnished with more numerous and shorter spines, and it is moreover a smaller, much more constricted species.

Var. **pulchrum** W. et G. S. West in Journ. Bot. 1897, p. 179, t. 369, f. 3.

HUILLA.—In editis de Morro de Lopollo ; Feb. 1860. No. **192.**

12. **S. actinotum** W. et G. S. West in Journ. Bot. 1897, p. 180, t. 369, f. 4.

HUILLA.—In paludibus exsiccandis ; April 1860. No. **176.**

This peculiar *Staurastrum* does not appear to be closely related to any other.

Var. **simplex** W. et G. S. West, *l.c.*, t. 369, f. 5.

HUILLA.—Inter *Utricullariam*, Morro de Lopollo; April 1860. No. **179.**

13. **S. cassidum** W. et G. S. West in Journ. Bot. 1897, p. 180, t. 368, f. 21.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo ; May 1860. No. **15.**

This species is distinguished from *S. trihedrale* Wolle (Desm. U.S. 123, pl. 40, f. 12–14 ; W. et G. S. West in Trans. Linn. Soc. 2nd ser. v. 260-1, t. xvi. f. 29) by its smaller size, its more conical semi-cells with comparatively broader apices and almost straight sides, by the form of its vertical view, and by the much smaller and more numerous markings on the membrane. *S. trihedrale* var. *rhomboideum* W. et G. S. West (*l.c.* f. 30) seems to be intermediate in form between this species and *S. trihedrale*, but it has the characteristic basal angles, the narrow apex, and the markings of *S. trihedrale*, whereas none of these characters are possessed by *S. cassidum.*

14. **S. areolatum** W. et G. S. West in Journ. Bot. 1897, p. 180, t. 367, f. 17.

HUILLA.—Inter *Utricullariam*, Morro de Lopollo ; April 1860. No. **179.**

This is very distinct from *S. cosmarioides* Nordst. [in Vidensk. Medd. f. d. naturh. Foren. (1869), no. 14–15, 223, t. iv. f. 43 (1870)], and it is different in the form of its front view and in its membrane from any species of *Cosmarium*. Börgesen, in Vidensk. Medd. f. d. naturh. Foren., Kjöben. 1890, 50 (1891), figures (under a wrongly stated magnification !) under the name of *S. cosmarioides* forms which he suggests may be trigonal and tetragonal forms of several species of *Cosmarium*. His fig. 2 somewhat approaches this species in form, but it has different basal angles and a very different sinus.

15. **S. scrobiculatum** W. et G. S. West in Journ. Bot. 1897, p. 181, t. 368, f. 18.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo ; May 1860. No. **15.**

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16. **S. punctulatum** Bréb. in Ralfs, Brit. Desm. 133, t. xxii. f. 1 (1848); W. et G. S. West in Journ. Bot, 1897, p. 181.

Forma 3-*gona.*

PUNGO ANDONGO.—In rivulis Præsidii (Casalalé); March 1857. No. **105**.

Forma 4-*gona.*

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

17. **S. dilatatum** Ehrenb. Infus. 143, t. x. f. 13 (1838); Ralfs, Brit. Desm. 133, t. xxi. f. 8 (1848); W. et G. S. West, *l.c.*

PUNGO ANDONGO.—In rivulis Præsidii (Casalalé); March 1857. No. **105**.

Var. **insignis** Racib. in Rosprawy Akad. Umiej. Krakow, Wydzial. Mat.-przyr. ser. 2, t. ii. (vol. xxii.) 388, t. vii. f. 13 (1892); W. et. G. S. West, *l.c.*

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

18. **S. hexacerum** Wittr. in Bih. t. K. Vet.-Akad. Handl. Bd. 1. no. 1, 51 (1872); W. et G. S. West, *l.c.* *Desmidium? hexaceros* Ehrenb. Abhandl. Akad. Wissenschaft., Berlin, 1833, 293 (1835); Infus. 141, t. x. f. 10 (1838).

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

19. **S. micron** W. et G. S. West in Journ. R. M. S. 159, t. iv. f. 50–51 (1896).

Var. **angolense** W. et G. S. West in Journ. Bot. 1897, p. 181, t. 368, f. 19.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

20. **S Gurgeliense** Schmidle in Oesterreich. Botan. Zeitschr. 64, t. xvi. f. 23, 24 (1896).

Var. **tropicum** W. et G. S. West in Journ. Linn. Soc. 1897, p. 182, t. 368, f. 20.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

This may be a proper species, but only one example was met with and, until further examples are obtained, it had better be regarded as a variety of Schmidle's alpine species.

21. **S. elegantissimum** Johnson in Bull. Torr. Bot. Club, xxi. 290, t. 211, f. 16 (1894).

Var. **reductum** W. et G. S. West in Journ. Bot. 1897, p. 182.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

22. **S. cerastoides** W. et G. S. West in Journ. Bot. 1897, p. 182, t. 369, f. 13.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utricularíis constituens; May 1860. No. **15**. Etiam in paludibus exsiccandis; April 1860. No. **176**.

This species possesses in common with its nearest ally *S. Cerastes*

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Lund. a smooth under surface to the processes which have a faintly recurved apex, as well as a double series of warts along each side. The character and arrangement of these warts, however, its less incurved processes, the different form of its semicells, together with the constantly fusiform vertical view, readily distinguish it.

23. **S. gracile** Ralfs in Ann. Nat. Hist. xv. 155–6, t. xi. f. 3 (1845); Brit. Desm. 136, t. xxii. f. 12 (1848).

Var. **cyathiforme** W. et G. S. West in Trans. Linn. Soc. ser. 2, v. 77, t. ix. f. 2 (1895); Journ. Bot. 1897, p. 182.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

Var. **pusillum** W. et G. S. West in Trans. Linn. Soc. ser. 2, v. 77, t. ix. f. 4.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

24. **S. angolense** W. et G. S. West in Journ. Bot. 1897, p. 183, t. 368, f. 22.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

The nearest species to this is *S. brachioprominens* Börg. in Vidensk. Medd. f. d. Naturh. Foren., Kjöben. (1890), 47, t. v. f. 52 (1891); W. et G. S. West in Trans. Linn. Soc. ser. 2, v. 265, t. xvii. f. 12 (1896), from which it differs in the absence of the denticulate apical verrucæ and the basal rings of granules, in the presence of the two transverse rows of granules at each side, and in the somewhat shorter and thicker processes.

25. **S. quadridentatum** W. et G. S. West in Journ. Bot. 1897 p. 183, t. 369, f. 15, 16.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Etiam inter *Utricularium*, Morro de Lopollo; April 1860. No. **179**.

14. **ARTHRODESMUS** Ehrenb. (1836).

1. **A. hiatus** W. B. Turn. in K. Sv. Vet.-Akad. Handl. Bd. 25, no. 5, 134, t. xi. f. 34 and 40 and t. xii. f. 1 (1893); W. et G. S. West in Journ. Bot. 1897, p. 235.

HUILLA.—In editis de Morro de Lopollo; Feb. 1860. No. **192**.

The specimens have the minute spines almost patent and not converging; the apices are not so flattened as in Turner's figures.

15. **GYMNOZYGA** Ehrenb. (1840).

1. **G. moniliformis** Ehrenb. in Bericht. Verh. Preuss. Akad. Wissenschaft, Berlin, 212 (1840); W. et G. S. West *l.c.*

Desmidium Borreri Ralfs in Ann. Nat. Hist. xi. 375, t. 8, f. 4 (1843). *Didymoprium Borreri* Ralfs, *l.c.*, xvi. 10 (1845); Brit. Desm. 58–9, t. iii. (1840). *Bambusina Brebissonii* Kütz. Phyc. Germ. 140 (1845).

HUILLA.—Inter *Utricularium*, Morro de Lopollo; April 1860. No. **179**.

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XII. VAUCHERIACEÆ.

1. **VAUCHERIA** DC. (1803).

1. **V. sessilis** DC. Flor. Fr. ii. 63 (1805); Cooke, Brit. Freshw. Alg. 123, t. 46, f. 1–20 and t. 48, f. 1–5; W. et G. S. West in Journ. Bot. 1897, p. 235.

Ectosperma sessilis Vauch. Hist. Conferv. 31, t. ii. f. 7 (1803).

Golungo Alto.—In fossis exsiccatis adhuc humidis in Varzea pone domicilium Isidri; Aug. and Sept. 1855. No. **132**. Covers in Aug. and Sept. all the half-dried-up ditches of the marshy plain (Varsea).

Var. **monogyna** W. et G. S. West in Journ. Bot. 1897, p. 235.

Golungo Alto.—Ad margines stagnorum rivi Cuango; Aug. 1857. No. **155**.

XIII. HYDROGASTRACEÆ.

1. **BOTRYDIUM** Wallr. (1815).

1. **B. granulatum** Grev. Alg. Brit. 196, t. xix. (1830); Cooke, Brit. Freshw. Alg. 114, t. 45.

Ulva granulata L. Sp. Pl. 1633. *Hydrogastrum granulatum* Desv.

Var. **æquinoctiale** W. et G. S. West in Journ. Bot. 1897, p. 235.

Loanda.—Non infrequens in territor. Loandensis terris humidis argillaceo-arenosis, latis plagis imo urbis ipsius plateas etc. obtegens; mox post pluvias copiosas nascens, citoque tempore sicco disparens. Ad fin. April 1854. No. **199**.

Very little could be made out from the specimens, which were on dried mud, but a rough sketch made by Welwitsch accompanying them was sufficiently characteristic of the genus.

XIV. PALMELLACEÆ.

1. **CŒLASTRUM** Näg. (1849).

1. **C. robustum** Hantzsch in Rabenh. Alg. Europ. no. 1407; Reinsch in Abhandl. Naturhist. Gesellsch. Nürnberg, Bd. 3, H. 2, 88 (1866); Schmidle in Berichte der Naturfors. Gesellsch. Freib. 79, t. ii. f. 11 (1893); W. et G. S. West in Journ. Bot. 1897, p. 236.

C. indicum W. B. Turn. in K. Sv. Vet.-Akad. Handl. Bd. 25, no. 5, 161, t. xx. f. 11 (1893).

Libongo.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

Var. **confertum** W. et G. S. West, *l.c.*

Libongo.—Cum form. typ. No. **204**.

2. **SORASTRUM** Kütz. (1845).

1. **S. spinulosum** Näg. Gatt. einz. Alg. 99, t. v. D. (1849); W. et G. S. West, *l.c.*

Libongo.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

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3. **PEDIASTRUM** Meyen (1829).

1. **P. Tetras** Ralfs in Ann. Nat. Hist. xiv. 469, t. 12, f. 4 (1844); W. et G. S. West, *l.c.*

Micrasterias Tetras Ehrenb. (1838).

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**. Inter *Utricularium*, Morro de Lopollo; April 1860. No. **179**.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

4. **OPHIOCYTIUM** Näg. (1849).

1. **O. majus** Näg. Gatt. einz. Alg. 89, t. iv. A, fig. 2 (1849); W. et G. S. West, *l.c.*

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

2. **O. parvulum** A. Br. Alg. Unicell. 55 (1855); W. et G. S. West, *l.c.*

Brochidium parvulum Perty.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

5. **SCENEDESMUS** Meyen (1829).

1. **S. denticulatus** Lagerh. in Ofv. Kongl. Vet.-Akad. Förhandl. 1882, no. 2, 61, t. ii. f. 13–16.

Var. **linearis** Hansg. in Archiv. Naturwiss. Landesdurchf. Böhm. Bd. 6, no. 268 (1888); W. et G. S. West in Journ. Bot. 1897, p. 237.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

6. **TETRAEDRON** Kütz. (1845).

1. **T. minimum** Hansg. in Hedwigia, 1888, 131; W. et G. S. West, *l.c.*

Polyedrium minimum A. Br. in Rabenh. Fl. Europ. Alg. iii. 62.

From the references given under the name *T. minimum* in his paper in "Hedwigia" it would appear that Hansgirg was under the erroneous impression that Braun described this plant in Rabh. Fl. Europ. Alg. as a *Tetraëdron*.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

2. **T. tropicum** W. et G. S. West in Journ. Bot. 1897, p. 237.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

This should be compared with *T. reticulatum* (Reinsch) Hansg.: in the latter species the membrane is not nearly so thick, and the scrobiculations are so large that the superficial part of the membrane only consists of a fine reticulation.

3. **T. tetragonum** Hansg. *l.c.* (1888).

Polyedrium tetragonum Näg. Gatt. einz. Alg. 84, t. iv. B, fig. 2 (1849).

Var. **inerme** (Wille in Bihang t. K. Sv. Vet.-Akad. Handl. Bd. 8, no. 18 (1884), 12, t. i. f. 25); W. et G. S. West, *l.c.*

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HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

4. **T. pusillum** W. et G. S. West in Journ. Bot. 1897, p. 237.

Micrasterias pusilla Wallich in Ann. Mag. Nat. Hist. ser. iii. vol. v. 281, t. xiii. fig. 13 (1860). *Staurophanum pusillum* W. B. Turn. in K. Sv. Vet.-Akad. Handl. Bd. 25, no. 5, 159, t. xx. f. 22 (1893).

Var. **angolense** W. et G. S. West in Journ. Bot. 1897, p. 237.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

We see no reason for Turner's genus *Staurophanum*, as no clear line of demarcation can be drawn between those species which it would include and those referable to *Tetraëdron*. Indeed *Tetraëdron pusillum* is very closely connected through its var. *angolense* with *T. lobulatum* (Näg.) Hansg.

5. **T. regulare** Kütz. Phyc. Germ. 129 (1845); W. et G. S. West, *l.c.*

Polyedrium tetraëdricum Näg. Gatt. einz. Alg. 84, t. iv. B, fig. 3 (1849).

PUNGO ANDONGO.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

Forma majus Reinsch in Abhandl. Naturhist. Gesellsch. Nürnberg, Bd. 3, H. 2, 77, t. v. fig. 2 (1866); W. et G. S. West, *l.c.*

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

7. **BOTRYOCOCCUS** Kütz. (1849).

1. **B. Micromorus** W. et G. S. West in Journ. Bot. 1897, p. 238.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

8. **OOCYSTIS** Näg. (1855).

1. **O. Novæ Semliæ** Wille in Ofv. Kongl. Vet.-Akad. Förhandl. 1879, no. 5, 26, t. xii. f. 3; W. et G. S. West, *l.c.*

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

Var. **maximum** West in Journ. R. M. S. 13, t. ii. f. 25 (1894); W. et G. S. West in Journ. Bot. 1897, p. 238.

This is yet a larger form than the British one.

GOLUNGO ALTO.—Ad margines stagnorum rivi Cuango; Aug. 1857. No. **155**.

2. **O. solitaria** Wittr. in Wittr. & Nordst. Alg. Aq. Dulc. Exsicc. Fasc. v. no. 244; Bot. Not. 1879, 24; W. et G. S. West, *l.c.* in Journ. Bot. 1897, p. 238.

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

LIBONGO.—Ad margines flum. Lifune; Sept. 1858. No. **204**.

Forma major Wille in Ofv. Kongl. Vet.-Akad. Förhandl. 1879, no. 5, 26; W. et G. S. West, *l.c.*

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

9. **ATHROOCYSTIS** W. et G. S. West in Journ. Bot. 1897, p. 238.

1. **A. ellipsoidea** W. et G. S. West, *l.c.*

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MOSSAMEDES.—In stagnis *Lemna paucicostata* tectis cum *Typha* et *Junco* prope Aguada ; July 1859. No. **131.**

This alga, by reason of its small families of densely-crowded cells and the nature of its integument, differs considerably from any other genus of *Palmellaceæ*.

10. **GLŒOCYSTIS** Näg. (1849).

1. **G. gigas** Lagerh. in Ofv. Kongl. Vet.-Akad. Förhandl. 1883, no. 2, 63 ; W. et G. S. West, *l.c.*

Protococcus gigas Kütz. Phyc. Germ. 145 (1845); Verwandl. der Infus. fig. vi. 1 (1844). *Chlorococcum gigas* (Kütz.) Grun.

LIBONGO.—Ad margines flum. Lifune ; Sept. 1858. No. **204.**

2. **G. Rupestris** Rabenh. Kryptog. Flor. Sachs. 128 (1863); W. et G. S. West in Journ. Bot. 1897, p. 239.

Palmella rupestris Lyngb. Tentamen Hydrophyt. Dan. 207, t. 69, fig. D (1819).

PUNGO ANDONGO.—Alga terrestris, ad ligna putrescentia in rupium convallibus ipsius Præsidii ; Nov. 1856. No. **110.**

3. **G. vesiculosa** Näg. Gatt. einz. Alg. 66, t. iv. F. (1849) ; W. et G. S. West, *l.c.*.

LIBONGO.—Ad margines flum. Lifune ; Sept. 1858. No. **204.**

11. **UROCOCCUS** Kütz (1849).

1. **U. insignis** Kütz. Spec. Alg. 207 (1849) ; W. et G. S. West, *l.c.*

Hæmatococcus insignis Hass. Brit. Freshw. Alg. 324, t. lxxx. f. 6 (1845). *Chroococcus macrococcus* Rabenh.

HUILLA.—In paludibus exsiccandis ; April 1860. No. **176.**

After enumerating the characters of his "First Subgenus" of *Hæmatococcus* Ag., Hassall (Brit. Freshw. Alg. i. 322) says that "the term *Ouracoccus* might be applied to the species of this subgenus." Improving on this suggestion, Kützing, according to the reference on p. 206 of his "Species Algarum," establishes the genus *Urococcus* of Hassall ; but it cannot be held to constitute publication of a new genus, and, if *Urococcus* is to stand, it must be as *Urococcus* Kütz. Spec. Alg. 206 (1849).

12. **STICHOCOCCUS** Näg. (1849) ; em. Gay (1891).

1. **S. flaccidus** Gay, Recherches quelq. Alg. Vertes, 79, t. xi. f. 101–106 (1891) ; W. et G. S. West, *l.c.*

Ulothrix flaccida Kütz. Spec. Algar. 349 (1849).

LOANDA.—Inter *Protococcum botryoidem* (Kütz.) Kirchn. ; Oct. 1858. No. **128.**

13. **PROTOCOCCUS** Ag. (1824).

1. **P. viridis** Ag. Syst. Algar. 13 (1824) ; Kütz. Tab. Phyc. i. (1845–9), p. 3, t. 3 ; W. et G. S. West, *l.c.*

LOANDA.—Ad parietes domorum etc. sæpius humectatas (also on flower-pots) in ipsa urbe Loanda, ast sparsim. Locus habitationis hujus algæ austrum versus spectat ; July 1854. No. **126.**

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2. **P. botryoides** Kirchn. in Cohn, Kryptog. Flora Schles. Bd. 2, Erste Hälfte, 103 (1879); W. et G. S. West, *l.c.*

Microhaloa botryoides Kütz. Phys. General. 169 (1843); Tab. Phyc. i. (1845–9), 6, t. 7.

LOANDA.—A light green coating on the inside of wooden water reservoirs, often remaining dry, in the garden of Dr. Mendes Alfonso's house; Oct. 1858. No. **128.**

MYXOPHYCEÆ.

XV. RIVULARIACEÆ.

1. **CALOTHRIX** Ag. (1824).

1. **C. fusca** (Kütz.) Born. et Flah. in Ann. Sci. Nat. 7e série, Bot. iii. 364 (1886); W. et G. S. West, *l.c.*

Mastichothrix fusca Kütz. in Phyc. General. 232 (1843).

PUNGO ANDONGO.—In *Batrachospermo gracillimo* ad lapides submersas in rivulo de Tangue ips. Præsidii; May 1857. No. **3.**

2. **C. breviarticulata** W. et G. S. West in Journ. Bot. 1897, p. 240.

PUNGO ANDONGO.—Epiphytica in *Mougeotia angolensi* ad ramulos Podostemacearum (*Tristicha trifaria* Tul.) in rivulis Præsidii (Casalalé); March 1857. No. **105.**

The habit, together with the gradual attenuation of the filaments, brings this nearest to *C. adscendens* (Näg.) Born. et Flah. (*l.c.*, 365); but its smaller size, its shorter filaments, and its very short cells easily distinguish it. The younger plants, which have only attained a length of about 100 μ and a thickness of 5·5–7·5 μ., have their cells only 2–3 times shorter than the diameter. It also comes near to *C. endophytica* Lemmermann in Forschungsberichte Biolog. Station zu Plön, iv. 184 (1896), but has a different sheath and very short filaments; the heterocysts are also very distinct.

3. **C. epiphytica** W. et G. S. West in Journ. Bot. 1897, p. 240.

MOSSAMEDES.—Epiphytica in *Œdogonii* sp., freq. in stagnis puris ad ripas flum. Bero; Aug. 1859. No. **190.**

2. **DICHOTHRIX** Zanardini (1858).

1. **D. olivacea** Born. et Flah., *l.c.*, 375 (1886); W. et G. S. West, *l.c.*

Calothrix olivacea Hooker (1845).

PUNGO ANDONGO.—Inter *Scytonema Myochrous* var. *chorographicum*, in summis rupibus Præsidii; Feb. 1857. No. **6.** Etiam inter *Scytonema Millei* ad rupes vulc. humectatas prope Cacella ips. Præsidii; Feb. 1857. No. **7.**

2. **D. gypsophila** Born. et Flah., *l.c.* 377–8 (1886); W. et G. S. West, *l.c.*

Schizosiphon gypsophilus Kütz. Phyc. Gener. 234, t. 6, fig. 2 (1843).

This seems to have been luxuriantly developed, and reached 5 mm. in height; the filaments were not incrusted with lime, as is often the case with this species.

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PUNGO ANDONGO.—Inter *Scytonema Myochrous* var. *chorographicum*, in rupib. perpendic. ad latera boreal. et occid. de Pedra Songue; April 1857. No. **12**. Inter *Scytonema cincinnatum* var. *æthiopicum*, in pascuis spongiosis breviter graminosis juxta rupes gig. Præsidii prope Catete; May 1857. No. **111**.

3. **GLŒOTRICHIA** J. Ag. (1842).

1. **G. æthiopica** W. et G. S. West in Journ. Bot. 1897, p. 240.

MOSSAMEDES.—Satis freq. inter Charæ speciem in rivo Caroca vel Croque prope Cabo negro; Sept. 1859. Nos. **19** and **173**.

This species differs from *G. natans* (Hedwig) Rabenh. Deutschl Kryptog.-Flora, 90 (1847), in the length of its cells and in its spores.

XVI. SIROSIPHONIACEÆ.

1. **HAPALOSIPHON** Näg. (1849).

In this genus the *spores* are produced from the ordinary vegetative cells of certain of the plants. They are formed from the majority of (or even all) the cells of both the primary filaments and branches of some portions of these plants, and have always thick yellowish-brown cell-walls. The outward form of the spores varies with the different species, the dimensions being about those of the vegetative cells. (Cf. also Hansgirg in Oesterreich. Bot. Zeitschr. xxxiv. 393 (1884); West in Journ. Linn. Soc. xxx. 272, pl. xv. f. 23–28.) In most of the species the branches arise at right angles to the main filament, and the cell of the main filament directly under the branch projects slightly into the sheath of the latter.

1. **H. luteolus** W. et G. S. West in Journ. Bot. 1897, p. 241.

HUILLA.—Inter alias algas, in uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. **15**. In graminosis paludosis juxta rivulum Lopollo; April 1860. No. **180**. Etiam Morro de Lopollo; May 1860. No. **182**.

This species occurs in minute tufts, and the great resemblance to each other of the primary filaments and branches, together with their thick yellowish sheaths, characterise it.

2. **H. aureus** W. et G. S. West in Journ. Bot. 1897, p. 241.

HUILLA.—Inter *Schizotrichem fuscescentem*, in paludibus exsiccandis; April 1860. No. **176**. Etiam inter *Utricularium*, Morro de Lopollo; April 1860. No. **179**.

This has a very distinct facies from *H. luteolus*, being of a bright golden brown colour, with more tortuose filaments, the sheaths of which have a very different appearance; the cells also are much more variable (and usually longer), the branches are more numerous and of a thickness different from that of the primary filaments, and often arise in pairs.

3. **H. intricatus** West in Journ. Linn. Soc. xxx. 271–2, pl. xv. f. 16–28 (1894); W. et G. S. West in Journ. Bot. 1897, p. 242.

An aquatic form; spores rectangular oblong, $1\frac{1}{2}$–3 times longer than broad.

HUILLA.—In cæspitibus parvis intricatis inter *H. luteolum*, in uligi-

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nosis editioribus, prope Humpata, Empalanca et Lopollo ; May 1860. No. **15**.

4. **H. Welwitschii** W. et G. S. West in Journ. Bot. 1897, p. 242.

PUNGO ANDONGO.—Inter *Batrachospermum gracillimum* in rivulo de Tangue ips. Præsidii ; May 1857. No. **3**.

This species may be compared with *H. hibernicus* W. et G. S. West (in Journ. R. M. S. 1896, 163), from which it differs in the longer cells of the primary filaments ; in having much fewer branches, which are also shorter and not flexuose ; moreover, the cells of the branches, as well as the heterocysts, never attain the length of those of *H. hibernicus*. Compare also with *H. intricatus* West.

2. **STIGONEMA** Ag. (1824).

The cells of this genus are protoplasmically continuous throughout the whole plant, a fine strand of protoplasm, passing from cell to cell along the middle of the filament, effecting this continuity. This is best seen in plants that have been dried and soaked out, the cells then appearing like beads on a string. These connecting threads are not visible in living plants, but in becoming dry the protoplasm shrinks away from the minute canal along which it passes through the septa, and on soaking again does not reattain its natural position.

1. **S. ocellatum** Thur. in Ann. Sc. Nat. 6e ser. Bot. i. 380 (1875) ; W. et G. S. West in Journ. Bot. 1897, p. 243.

Conferva ocellata Dillw. Brit. Conferv. 60–1, Supp. pl. D (1809). *Sirosiphon ocellatus* Kütz. Spec. Algar. 317 (1849) ; Tab. Phyc. ii. (1850–2), 11, t. 37, f. ii.

PUNGO ANDONGO.—A small form ; in small quantity amongst *Zygnema* sp., growing on tufts of *Scytonema Myochrous* var. *chorographicum*, on rocks on the northern and western sides of Pedra Songue ; April 1857. No. **153**.

Forma major W. et G. S. West in Journ. Bot. 1897, p. 243.

A large and finely developed aquatic form.

HUILLA.—Inter *Utricularíam*, Morro de Lopollo ; April 1860. No. **179**. In paludibus exsiccandis ; April 1860. No. **176**.

2. **S. flexuosum** W. et G. S. West in Journ. Bot. 1897, p. 243.

HUILLA.—Inter *Hapalosiphonem luteolum* et *Microsporam Löfgrenii*, etc., in uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus, et Utricularíis constituens ; May 1860. No. **15**. Etiam Morro de Lopollo ; May 1860. No. **182**.

This is distinguished from *S. panniforme* (Ag.) Born. et Flah. by its habit, its very different branching, its almost colourless sheath with smooth exterior, and by the round apices of the branches, as well as by its somewhat smaller size.

3. **S. minutum** Hass. Brit. Freshw. Alg. i. 230 ; ii. t. lxvii. f. 3, 4 (1845) ; Born. et Flah. in Ann. Sci. Nat. 7e série, Bot. v. 72–74 (1887) ; W. et G. S. West in Journ. Bot. 1897, p. 243.

Scytonema minutum Ag. Synop. Algar. Scandin. 117 (1817).

HUILLA.—In graminosis paludibus juxta rivulum de Lopollo ; April 1860. No. **180**.

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4. **S. informe** Kütz. Spec. Algar. 319 (1849); Tab. Phyc. ii. (1850–2), 11, t. 38, fig. iii.; Born. et Flah., *l.c.*, 75–77 (1887); W. et G. S. West in Journ. Bot. 1897, p. 243.

PUNGO ANDONGO.—Inter *Scytonema Myochrous* **var.** *chorographicum*, in summis rupib. Præsidii (Pedras negras); Feb. 1857. No. **6**.

3. **NOSTOCHOPSIS** Wood (1869).

1. **N. lobatus** Wood in Proc. Amer. Phil. Soc. Philadelphia, 127 (1869); in Smithson. Contrib. Knowl. (1874), iii. 45, t. iii. f. 6; Born et Flah., *l.c.*, 80 (1887); W. et G. S. West in Journ. Bot. 1897, p. 264.

GOLUNGO ALTO.—Ad rupes inundatas in rivulo Muria pr. Muria sparsius; Sept. 1854. No. **201**.

The examples of this are very fine, and agree well with the figure given by Wille (in Bihang t. K. Sv. Vet.-Akad. Handl. Bd. 8, no. 18, t. i. f. 1–19), with the exception of the cell-walls; portions only were as moniliform as the previously-found African examples. (Cf. W. et G. S. West in Journ. Bot. 1896, 381, t. 361, f. 1–2).

The cell-walls are very thin indeed, not any more appreciable than the cell-walls in the ordinary vegetative cells of a *Nostoc*. The majority of the heterocysts are lateral, globose, and either sessile or stalked (usually supported on one or two cells); sometimes they are intercalary, and then they are always elliptic-oblong.

XVII. SCYTONEMACEÆ.

1. **SCYTONEMA** Ag. (1824).

1. **S. cincinnatum** Thur. in Ann. Sci. Nat. 6^{e} série, Bot. i. 380 (1875); Born et Flah., *l.c.*, 89 (1887).

Calothrix lanata Kütz. Algar. Aq. Dulc. Dec. I. no. 5 (1833).

Var. **æthiopicum** W. et G. S. West in Journ. Bot. 1897, p. 264.

PUNGO ANDONGO.—Alga nigrescens, lubrica, tenax, rhizomata Xyridearum aliarumque plant. palustrium, in spongiosis crescentium, crassis membranis obducens, matricibus tenaciter adhærens—sicque imprimis loca spongiosa formans. Cum *Dichotriche gypsophila* et *Mougeotia irregulari* in pascuis spongiosis breviter graminosis juxta rupes gig. Præsidii prope Catete; May 1857. No. **111**.

2. **S. rivulare** Borzi in Nuovo Giornale Bot. Ital. xi. 373 (1879) Born. et Flah. *l.c.*, 91 (1887); W. et G. S. West, *l.c.*

PUNGO ANDONGO.—Ad muscos rupestres rivulos crescentes perrepens, in Mimosarum sylvis pr. Pedras de Guinga; Jan. 1857. No. **13**.

Stratum golden-brown or violet; branches rather scarce, usually solitary, short, a little narrower than the primary filaments; cells sometimes a little longer than the diameter; sheaths constantly asperulate.

This is a most interesting species, having been previously seen only from Italy by its original describer.

3. **S. Arcangelii** Born. et Flah., *l.c.*, 92 (1887); W. et G. S. West in Journ. Bot. 1897, p. 265.

GOLUNGO ALTO.—Ad muscos prope fontem magn. ad Banza de Sobato de Bango sitam; Sept. 1855. No. **159**.

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The following may be a larger form of this species:—

GOLUNGO ALTO.—Filaments forming somewhat irregular penicillate tufts of a brown colour. Crass. fil. 23–25 μ; crass. trich. 14·5–17 μ. The specimens were not in a condition for satisfactory identification. Ad fontem prope Banza de Bango, socialis cum Anthocero, etc.; Sept. 1855. No. **158**.

4. **S. Millei** Born. in Born. et Thur. Notes Algolog. 147 (1880); Born et Flah., *l.c.*, 93 (1887); W. et G. S. West in Journ. Bot. 1897, p. 265.

Heterocysts sometimes subquadrate.

PUNGO ANDONGO.—Ad rupes vulc. humectatas prope Cacella ips. Præsidii, inter *Dichotrichem olivaceam*; Feb. 1857. No. **7**.

5. **S. ambiguum** Kütz. Spec. Algar. 894 (1849); Tab. Phyc. ii. (1850–2), 7, t. 26, f. ii.; Born. et Flah., *l.c.*, 100 (1887); W. et G. S. West in Journ. Bot. 1897, p. 265.

PUNGO ANDONGO.—Inter *S. Myochrous* var. *chorographicum*; Feb. 1857. No. **6**.

The heterocysts are about three times longer than broad, and sometimes as many as three together.

6. **S. figuratum** Ag. Syst. Algar. 38 (1824); Born. et Flah., *l.c.*, 101–3 (1887); W. et G. S. West, *l.c.*

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**. In graminosis paludibus juxta rivulum de Lopollo; April 1860. No. **180**.

7. **S. Myochrous** Ag. Dispos. Algar. Suec. 38 (1812); Born. et Flah., *l.c.*, 104–6 (1887).

Conferva Myochrous Dillw. Brit. Conferv. 37, t. 19 (1802).

Var. **chorographicum** W. et G. S. West in Journ. Bot. 1897, p. 265.

PUNGO ANDONGO.—Freq. et temp. pluv. (Dec. usque Apr.) læte vegetans, in summis rupibus Præsidii; Feb. 1857. No. **6**. Alga erecta vel decumbens, cæspitose crescens, filamentis oculo nudo nigris, penicillatim e centro adh. radiantibus, mox latas rupium gigant. plagas, imprimis verticales, colore atro tingens, qua ex causa = *Pedras negras* de Pungo Andongo.

Etiam ad latera boreal. et occid. de Pedra Songue; April 1857. No. **12**. Alga terrestris vel potius rupestris, eximie gregaria, incrementi rapidissimi, juventute et tempore per dies nebuloso atrovirens, solis luce et nidore cito nigrescens, latissimas rupium plagas perpendiculares colore aterrimo tingens.

This agrees in every particular with *S. Myochrous*, with the exception that the filaments are never ocreate. From *S. figuratum* it differs in being of larger dimensions, and in having a relatively thicker sheath.

8. **S. insigne** W. et G. S. West in Journ. Bot. 1897, p. 266.

GOLUNGO ALTO.—Ad rupes madidas in umbrosis juxta rivum Coango inter Sange et Undelle, nunc violaceo-viridis, nunc intensius violacea; May 1856. No. **5**. Etiam ad rupes rivul. Coango humect. pulvinula livido-cinerea spongiosa formans; June 1856. No. **140**.

This plant is noticeable for the variability of its filaments, some

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having parallel margins with long cells, others having firm irregular margins with somewhat torulose trichomes, consisting of very short transversely elliptic cells of irregular size. The latter filaments much resemble the branches of a *Stigonema*. The sheaths of this plant are altogether remarkable, being quite colourless, and often very irregular in the margin; wherever they come in contact with each other they appear to coalesce, and this coalescence gives rise to a phenomenon (viz. the apparent inclusion of two parallel trichomes in the same sheath) which, so far as we are aware, has not been previously noticed in this genus. The branches are also most peculiar, the majority being solitary, and given off laterally from one cell of the primary filament precisely as in *Hapalosiphon*. Taking into consideration all these points, there are still unmistakable characters which place the plant in the genus *Scytonema*.

2. **TOLYPOTHRIX** Kütz. (1843).

After examining the three following species, we cannot agree with Bornet and Flahault in separating the genera *Hassalia* and *Tolypothrix*. The former is said to be distinguished from the latter by its fragile filaments and its terrestrial habit. The three species referred to are all terrestrial as described for *Hassallia*, but the sheaths (especially that of *T. crassa*) are very firm, persistent, and flexile, agreeing with those of *Tolypothrix*. Under which genus ought these species to be placed? The terrestrial habit points to *Hassallia*, the flexile and non-fragile filaments to *Tolypothrix*. It appears to us that the only character left to separate the two supposed genera is the fragility of the sheaths, which in itself is certainly an insufficient generic distinction.

1. **T. crassa** W. et G. S. West in Journ. Bot. 1897, p. 267.

PUNGO ANDONGO.—Ad dextr. flum. Cuanza locis palustribus inter Lythraceas, etc. prope Candumba; March 1857. No. **11**.

2. **T. phyllophila** W. et G. S. West in Journ. Bot. 1897, p. 267.

GOLUNGO ALTO.—Ad folia viva *Rinoreæ* (*Alsodeiæ*) spec. e Violacearum familia, in sylvis densis de Alto Queta; Dec. 1855 (*Sine numero*).

The nearest species to this is *T. byssoidea* (Hass. Brit. Freshw. Alg. i. 233–4; ii. t. lxvii. f. 5), from which it differs in its much thicker colourless sheath, which is not fragile, and in the usually longer cells.

3. **T. arenophila** W. et G. S. West in Journ. Bot. 1897, p. 267.

PUNGO ANDONGO.—Ad terram arenoso-humosam in editissimis rupibus Præsidii, Pedra Cazella, cum *Schizotriche delicatissima*; Jan. 1857. No. **151**.

4. **T. limbata** Thur. in Born. et Flah. in Ann. Sci. Nat. 7e série, Bot. v. 124 (1887); W. et G. S. West, *l.c.*

A smaller form with yellowish brown sheaths, which are often somewhat rough on the exterior.

MOSSAMEDES.—Cum *Oscillatoria tenui* in umbrosis muscosis ad ripam fluminis Bero, etiam in stagnis profundis post pluvias remanentibus pelliculas læte virides natantes formans, prope Cavalheiros; Aug. 1859. No. **191**.

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XVIII. NOSTOCEÆ.

1. **NOSTOC** Vauch. (1803).

1. **N. repandum** W. et G. S. West in Journ. Bot. 1897, p. 267.

PUNGO ANDONGO.—Freq. ad rupes editiores vulcan. Præsidii prope Cabondo tempore pluvio, intra dies duas tresve ingente copia obvia; Feb. 1857. No. **21**.

The nearest species to this is *N. humifusum* Carm., from which it is distinguished by its very large coriaceous non-tuberculate thallus, by its constantly elliptical or doliform cells, and by its larger heterocysts and spores.

2. **N. paradoxum** Welw. ex W. et G. S. West in Journ. Bot. 1897, p. 268.

PUNGO ANDONGO.—Ad muscos dense cæspitosos juxta rivulos prope Pedra Songue in ips. Præsidio; April 1857. No. **20**.

This species belongs to that division of the section *Humifusa* with cylindrical cells.

3. **N. muscorum** Ag. Dispos. Algar. Suec. 44 (1812); Kütz. Tab. Phyc. ii. (1850–2), 2, t. 5, f. iv.; Born. et Flah., *l.c.*, vii. 200–1 (1888); W. et G. S. West, *l.c.*

PUNGO ANDONGO.—Ad rupes schist. pr. Candumba-Calundo; Jan. 1857. No. **22**. Cambondo ad rupes; Feb. 1857. No. **285**.

4. **N. minutum** Desmaz. Plantes Cryptog. du Nord de la France, fasc. xi. no. 501 (1831); Born. et Flah., *l.c.*, 209 (1888); W. et G. S. West, *l.c.*

This is not identified with certainty, as it was seen in very small quantity; spores elliptical, concatenate.

MOSSAMEDES.—Inter *Œdogonii* sp. in stagnis puris ad ripas flum. Bero; Aug. 1859. No. **190**.

2. **ANABÆNA** Bory (1822).

1. **Anabænæ** sp. W. et G. S. West, *l.c.*

GOLUNGO ALTO.—Specimens very fragmentary, and spores not attached to the trichomes.

Freq. sed cito marcescens ad latera rivuli Coango; Aug. 1857. No. **163**.

XIX. CAMPTOTRICHEÆ.

W. et G. S. West in Journ. Bot. 1897, p. 268.

1. **CAMPTOTHRIX** W. et G. S. West, *l.c.*, p. 269.

1. **C. repens** W. et G. S. West, *l.c.*

HUILLA.—Epiphytica supra *Schizotrichem natantem* et *Microcoleum sociatum*, in uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens, 5000 ad 5500 ped. elevat.; May 1860. No. **15**.

The diverse forms of the cells and their irregular disposition in the short tapering filaments give a character to this genus not possessed by any other of the genera of either the *Vaginarieæ* or the *Lyngbyeæ*, and necessitated the plant being placed as the type of a new order (*Camptotricheæ*) of *Hormogoneæ Homocysteæ*.

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XX. VAGINARIEÆ.

1. **SCHIZOTHRIX** Kütz. (1843).

1. **S. elongata** W. et G. S. West in Journ. Bot. 1897, p. 269.

HUILLA.—Inter *Hapalosiphonem luteolum* et *Microsporam Löfgrenii*, etc., in uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

This differs from the other allied species in several noteworthy features, such as the extremely long flexuose attenuate filaments with few branches, the long cells, and the somewhat close cylindrical sheath.

2. **S. delicatissima** W. et G. S. West in Journ. Bot. 1897, p. 269.

PUNGO ANDONGO.—Cum *Tolypotriche arenophila*, ad terram arenoso-humosam in editissimis rupibus Præsidii, Pedra Cazella; Jan. 1857. No. **151**.

This species is very easily overlooked on account of its minute size and delicacy.

3. **S. Friesii** Gomont in Ann. Sci. Nat. 7e série, Bot. xv. 316–18, t. 9, f. 1, 2 (1892); W. et G. S. West in Journ. Bot. 1897, p. 270.

Oscillatoria Friesii Ag. Synops. Algar. Scand. 107 (1817).

HUILLA.—Alga gelatinosa, badio-fusca, folia Xyridearum in editis de Morro de Lopollo obducens; Feb. 1860. No. **192**.

4. **S. thelephoroides** Gomont, *l.c.*, 319, 320, t. 10, f. 1–4 (1892); W. et G. S. West, *l.c.*

Scytonema? thelephoroides Montagne, *l.c.*, 2e sér. Bot. xii. 45 (1839).

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

A few small examples of this species occurred in this gathering; we should like to have seen more of it, as it appears to be an aquatic form of the species.

5. **S. fuscescens** Kütz. Phyc. Gener. 230 (1843); Gomont, *l.c.*, 324–5, t. 11, f. 4–6 (1892); W. et G. S. West, *l.c.*

HUILLA.—Freq. apud *Hapalosiphonem aureum*, in paludibus exsiccandis; April 1860. No. **176**. Etiam in graminosis paludosis juxta rivulum de Lopollo; April 1860. No. **180**.

Var. **africana** W. et G. S. West in Journ. Bot. 1897, p. 270.

HUILLA.—Terrestris, cum *Porphyrosiphone Notarisii*, in pascuis pluv. autumnalibus frequentius inundatis, demum exsiccantibus, ad lacum magnum de Ivantala; March 1860. No. **18**.

6. **S. natans** W. et G. S. West in Journ. Bot. 1897, p. 270.

HUILLA.—Inter *Microsporam Löfgrenii*, etc., in uliginosis editioribus prope Humpata, Empalanca et Lopollo; plagas spongiosas unacum Eriocauloneis, Xyridibus et Utricullariis constituens; May 1860. No. **15**. Morro de Lopollo; May 1860. No. **182**. Etiam in graminosis paludosis juxta rivulum de Lopollo; April 1860. No. **180**.

The nearest species to this is *S. purpurascens* (Kütz.) Gomont, *l.c.* 320–1, t. 9, f. 6–8, from which it is distinguished by the much fewer branches of its more elongate filaments, its differently coloured sheaths which are much more attenuate at the apices (not acuminate), its less numerous and more elongate trichomes not constricted at the

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dissepiments, and in the cells never being shorter than the diameter, as well as in its subsolitary free-swimming habit.

2. **PORPHYROSIPHON** Kütz. (1850–52).

1. **P. Notarisii** Kütz. Tab. Phyc. ii. (1850–2), 7, t. 27, f. i.; W. et G. S. West. in Journ. Bot. 1897, p. 271.

This interesting and characteristic alga appears to have been abundant in the district traversed by Welwitsch.

PUNGO ANDONGO.—Alga terrestris, latissimas palustrium terrarum plagas colore sanguineo-ferrugineo tingens, prope Condo ; March 1857. No. **9**. Alga cæspitosa, glauco-viridis, inter muscorum cæspites in cryptis editiorum montis de Cazella crescens ; Dec. 1856. No. **107**. (These specimens appear to be old ones ; many of the sheaths were empty, and the red colour has mostly disappeared.)

HUILLA.—In udis sylvaticis et apricis inter Monino et lac. Ivantala latas plagas colore fusco-sanguineo obducens ; April 1860. No. **14**. Frequens in pascuis pluv. autumnalibus frequentius inundatis, demum exsiccantibus, ad lacum magnum de Ivantala ; March 1860. Nos. **17** and **18**. "Alga terrestris, atro- vel fusco-sanguinea, late cæspitosa, cæspitibus lubricis planis e filamentis tenacibus dense intertextis et contextis versus marginem radiantibus conflatis, terræ arcte adhærentibus ; loca, ubi frequens obvia hæc Alga, tempore spongiosa facta multis aliis stirpibus uliginosis solum præbent."

This Alga occasionally branches ; these branches are few and of the same thickness as the primary filament, around which they are closely coiled. The sheath of the branch becomes solid at the base, and is gradually merged into that of the primary filament, its trichome not being in any way connected with that of the latter. The branching really consists of a close application of the base of one filament to the sheath of another, the fusion being for such a short distance that the two trichomes are never present within the same sheath. It is of the same type as the branching present in *Schizothrix*, but the division into branches is deeper, causing the branches and primary filaments to be of equal thickness. The above remarks prove that *Porphyrosiphon* is very closely related to *Schizothrix*, and emphasizes its position in the *Vaginarieæ*. This affinity was inferred by Gomont (in Ann. Sci. Nat. 7e série, Bot. xv. 332) from a consideration of an entirely different character, viz. the structure of the sheath. Gomont's statement on the same page that *Porphyrosiphon* has no branches is, however, erroneous.

3. **POLYCHLAMYDUM** W. et G. S. West in Journ. Bot. 1897, p. 271.

1. **P. insigne** W. et G. S. West in Journ. Bot. 1897, p. 271, t. 365, f. 1, 2.

LOANDA.—Ad *Nitellam* et *Najadem* in lacu de Quifandongo ; Dec. 1853. No. **195**.

The peculiar sheaths of this genus readily distinguish it from the other genera of the *Vaginarieæ*, its nearest ally being *Dasyglœa* Thw., from which it differs in the very firm multitubular sheath with an open apex, and in the much thicker trichomes with very much shorter cells. There is a very distinct line of demarcation between the inner and outer constituents of the sheath, the outermost one being rendered conspicuous only by the extraneous material adhering to it. The trichomes are also usually without any interruption for a considerable length.

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4. **MICROCOLEUS** Desmaz. (1823).

1. **M. vaginatus** Gomont in Journ. de Botaniq. iv. 353 (1890); in Ann. Sci. Nat. 7e série, Bot. xv. 355–8, t. 14, f. 12 (1892).

Oscillatoria vaginata Vauch. Hist. Conferv. 200–1, t. xv. f. 13 (1803).

Var. **monticola** (Kütz.) Gomont in Ann. Sci. Nat., *l.c.*, 356 (1892); W. et G. S. West in Journ. Bot. 1897, p. 272.

PUNGO ANDONGO.—Inter *Porphyrosiphonem Notarisii* et *Lyngbyam ærugineo-cæruleam*, prope Condo; March 1857. No. **9**.

2. **M. sociatus** W. et G. S. West in Journ. Bot. 1897, p. 272.

HUILLA.—Inter *Schizotrichem natantem* et *Microsporam Löfgrenii*, in uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

This differs from *M. lacustris* (Rabenh.) Farlow in its narrower trichomes with cylindrical cells, its acutely conical apical cells, and in its firmer sheaths.

XXI. LYNGBYEÆ.

1. **SYMPLOCA** Kütz. (1843).

1. **S. Muscorum** Gomont in Journ. de Botaniq. iv. 354 (1890); in Ann. Sci. Nat. 7e série, Bot. xvi. 110–12, t. 2, f. 9 (1892); W. et G. S. West in Journ. Bot. 1897, p. 297.

Oscillatoria Muscorum Ag. Syst. Algar. 65 (1824).

(*α*) Crass. trich. 5·5–6 *μ*.

LOANDA.—Ad terram humidam urbis Loandæ, tempore pluvio; April 1854. No. **161**.

(*β*) Crass. trich. 8–9 *μ*.

HUILLA.—Alga atro-viridis, viscoso-gelatinosa, exsiccata fere penicilliformis, inter muscos (Bryum N.o 25) texta, in maxime umbrosis; Morro de Monino; Feb. 1860. No. **181**.

2. **LYNGBYA** C. Ag. (1824).

1. **L. aureo-fulva** W. et G. S. West in Journ. Bot. 1897, p. 298.

PUNGO ANDONGO.—Freq. in humidis ad dextram flum. Cuanza ex Candumba usque Quisonde; March 1857. No. **10**. "Alga terrestris, in vivo aureo-fulva vel flavescens, membranis spongiosis latissimis graminum cæspitibus intertexta, Droseraceis et Eriocaulonaceis solum spongiosum offerens."

2. **L. Martensiana** Menegh. Conspect. Algol. Eugan. 12 (1837); Gomont in Ann. Sci. Nat. 7e série, Bot. xvi. 145–6, t. 3, f. 17 (1892); W. et G. S. West, *l.c.*

GOLUNGO ALTO.—Ad muscos prope fontem magn. ad Bança do Sobato de Bango; Sept. 1855. No. **159**.

LOANDA.—Cum *Symploca Muscorum* ad terram humidam urbis Loandæ, tempore pluvio; April 1854. No. **161**.

3. **L. ærugineo-cærulea** Gomont, *l.c.*, 146–7, t. 4, f. 1–3 (1892); W. et G. S. West, *l.c.*

Oscillaria ærugineo-cærulea Kütz. Phyc. Gener. 185 (1843); Tab. Phyc. i. (1845–9), 28, t. 39, fig. ix.

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PUNGO ANDONGO.—Inter *Porphyrosiphonem Notarisii* prope Condo; March 1857. No. **9**.

4. **L. versicolor** Gomont, *l.c.*, 147, t. 4, fig. 4, 5 (1892); W. et G. S. West, *l.c.*

Phormidium versicolor Wartm. (1861).

MOSSAMEDES.—Ad ripas limosas flum. Bero pr. Cavalheiros; June 1859. No. **175**.

3. **PHORMIDIUM** Kütz. (1843).

1. **P. subsolitarium** W. et G. S. West in Journ. Bot. 1897, p. 298.

PUNGO ANDONGO.—In *Batrachospermo gracillimo* ad lapides submersas in rivulo de Tangue ips. Præsidii; May 1857. No. **3**.

The moniliform cells and the delicate hyaline sheath place this plant in the genus *Phormidium*, although the plants often occur singly. The elliptic cells and subsolitary habit characterise the species.

2. **P. angustissimum** W. et G. S. West in Journ. Bot. 1897, p. 298.

MOSSAMEDES.—Inter *Glæotrichiam æthiopicam* et *Charam* sp. in rivo Caroca prope Cabo Negro; Sept. 1859. No. **19**.

PUNGO ANDONGO.—Inter *Nostoc repandum* ad rupes editiores vulcan. Præsidii prope Cabondo tempore pluvio; Feb. 1857. No. **21**.

This narrow species is nearest to *P. laminosum* (Ag.) Gomont, but it is distinguished by its much narrower trichomes, which are constricted at the dissepiments, and its usually much longer cells.

3. **P. laminosum** Gomont in Journ. de Botaniq. iv. 355 (1890); in Ann. Sci. Nat. 7e série, Bot. xvi. 167–8, t. 4, f. 21, 22 (1892); W. et G. S. West, *l.c.*, p. 299.

Oscillatoria laminosa Ag. in Flora, x. 633 (1827).

GOLUNGO ALTO.—Ad terram limosam post pluvias; Dec. 1855. No. **166**.

4. **P. Corium** Gomont in Journ. de Botaniq. iv. 365 (1890); in Ann. Sci. Nat., *l.c.*, 172–3, t. 5, f. 1, 2 (1892); W. et G. S. West, *l.c.*

Oscillatoria Corium Ag. Dispos. Algar. Suec. 36 (1812).

SIERRA LEONE.—Cum *Oscillatoria animali* ad parietes humid. verticales urbis Freetown freq. latissimis plagis atro-nitentibus parietes obducens; Sept. 1853. No. **167**.

5. **P. papyraceum** Gomont in Journ. de Botaniq. iv. 355 (1890); in Ann. Sci. Nat., *l.c.*, 173–5, t. 5, f. 3, 4 (1892); W. et G. S. West, *l.c.*

Oscillatoria papyracea Ag. Syst. Algar. 61 (1824).

SIERRA LEONE.—Ad muscos (hepaticas) humidos in domicil. parietibus verticalibus urbis Freetown frequens tempore pluvio; Sept. 1853. No. **174**.

6. **P. Retzii** Gomont in Journ. de Botaniq. iv. 355 (1890); in Ann. Sci. Nat., *l.c.*, 175–8, t. 5, f. 6, 9 (1892); W. et G. S. West, *l.c.*

Oscillatoria Retzii Ag. Dispos. Algar. Suec. 36 (1812).

PUNGO ANDONGO.—Ad muscos (Jungermannias) submersas in rivulo Tangue pr. Catete; May 1857. No. **165**.

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7. **P. autumnale** Gomont in Ann. Sci. Nat., *l.c.*, 187–190, t. 5, f. 23, 24 (1892).

Oscillatoria autumnalis Ag., *l.c.*, 36 (1812).

Forma tenuis W. et G. S. West. in Journ. Bot. 1897, p. 299.

GOLUNGO ALTO.—Cum *P. laminoso* ad terram limosam post pluvias; Dec. 1855. No. **166**.

4. **PROTERENDOTHRIX** W. et G. S. West in Journ Bot. 1897, p. 299.

1. **P. scolecoidea** W. et G. S. West, *l.c.*

HUILLA.—In *Porphyrosiphone Notarisii*, prope lac. Ivantala; March 1860. Nos. **17** and **18**.

This genus must be placed in the *Lyngbyeæ* on account of the structure of the sheath, which contains a solitary trichome. The comparative width of the sheath, its hyaline character with irregular margin, along with the peculiar habit of the plant, characterise the genus. The younger plants (consisting of short filaments of 12–20 cells) are endophytic, occurring between the lamellæ of the sheath of *Porphyrosiphon*. As they increase in size they appear to break through the outer lamellæ of the sheath of the host, and to attach themselves closely to its outer surface by means of their own mucous envelope, which is now considerably broader.

5. **OSCILLATORIA** Vauch. (1803).

1. **O. limosa** Ag. Dispos. Algar. Suec. 35 (1812); Gomont in Ann. Sci. Nat. 7e série, Bot. xvi. 610–2, t. 6, f. 13 (1892); W. et G. S. West in Journ. Bot. 1897, p. 300.

SIERRA LEONE.—Ad terram et parietes juxta fontes prope Freetown; Sept. 1853. No. **168**.

2. **O. tenuis** Ag. Algar. Decas ii. 25 (1813); Gomont, *l.c.*, 220–1, t. 7, f. 2–3 (1892); W. et G. S. West, *l.c.*

INS. PRINCIPIS.—In stagnantibus prope Bahia de S. Antonio, ad limum subexsiccantem late cæspitosa; Sept. 1853. No. **169**.

MOSSAMEDES.—Cum *Tolypotriche limbata* in stagnis profundis prope Cavalheiros; Aug. 1859. No. **191**.

3. **O. animalis** Ag. in Flora, x. 632 (1827); Gomont, *l.c.*, 227–9 t. 7, f. 13 (1892); W. et G. S. West, *l.c.*

SIERRA LEONE.—Cum *Phormidio Corium* ad parietes humid. verticales urbis Freetown, freq. latissimis plagis atro-nitentibus parietes obducens; Sept. 1853. No. **167**.

4. **O. formosa** Bory, Dict. Class. d'Hist. Nat. xii. 474 (1827); Gomont, *l.c.*, 230–1, t. 7, f. 16 (1892); W. et G. S. West, *l.c.*

LOANDA.—In limo humido urbis Loandæ; April 1858. No. **170**.

5. **O. Okeni** Ag. in Flora, x. 633-4 (1827); Gomont, *l.c.*, 232 t. 7, f. 18 (1892); W. et G. S. West, *l.c.*

LOANDA.—In fonte tepida, sulphate (ferri ?) abundanti, pr. S. Pedro freq.; July and Aug. 1854. No. **164**.

6. **O. angustissima** W. et G. S. West in Journ. Bot. 1897, p. 300.

LOANDA.—Cum *O. Okeni* in fonte tepida, sulphate (ferri ?) abundanti, pr. S. Pedro freq.; July and Aug. 1854. No. **164**.

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The specimens of this species are very fine; it is a totally distinct plant from *Phormidium angustissimum*, though it is of the same thickness. It possesses no sheath, and the trichomes are much firmer and not so tortuose as those of the latter; its cells also are shorter and more indistinct.

XXII. CHAMÆSIPHONEÆ.

1. **SPHÆROGONIUM** Rostaf. (1883).

1. **S. incrustans** Rostaf. in Rosprawy Sprawozd. Posiedz. Akad. Umiej. x. 282, 304–5, t. v. f. 1–7 (1883); W. et G. S. West in Journ. Bot. 1897, p. 301.

Chamæsiphon incrustans Grun. in Rabenh. Flor. Europ. Alg. ii. 149.

Pungo Andongo.—Epiphyticum supra *Zygnema ericetorum* ad Podostemaceas (*Tristicha trifaria* Tul.) in riv. de Cabondo; Feb. 1857. No. **108**.

XXIII. CYSTOGONEÆ.

1. **DERMOCARPA** Crouan (1858).

1. **D. depressa** W. et G. S. West in Journ. Bot. 1897, p. 301.

Loanda.—Epiphytica supra *Pithophoram radiantem* in aquariis aquæ subdulcis insulæ Cassanga pr. Morro da Cruz; April 1854. No. **197**.

XXIV. CHROOCOCCACEÆ.

1. **GLŒOTHECE** Näg. (1849).

1. **G. confluens** Näg. Gatt. einz. Alg. 58, t. i. G, f. 1 (1849); W. et G. S. West, *l.c.*

Golungo Alto.—Cum *Chroococco schizodermatico* var. *badio-purpureo*, ad rupes juxta riv. Coango; June 1856. No. **139**.

2. **MERISMOPEDIA** Meyen (1839).

1. **M. glauca** Näg., *l.c.*, 55, t. i. D, f. 1 (1849); W. et G. S. West, *l.c.*

Gonium glaucum Ehrenb.

Huilla.—Inter *Utricularia*m, Morro de Lopollo; April 1860. No. **179**.

2. **M. hyalina** Kütz. Phyc. Germ. 142 (1845); Tab. Phyc. v. 12, t. 38, f. i. (1855); W. et G. S. West, *l.c.*

Huilla.—In paludibus exsiccandis; April 1860. No. **176**.

3. **TETRAPEDIA** Reinsch (1867).

1. **T. aversa** W. et G. S. West in Journ. Bot. 1897, p. 301.

Pungo Andongo.—In stagnis prope Anbilla (Condo); March 1857. No. **177**.

4. **GLŒOCAPSA** Kütz. (1843); em. Näg. (1849).

1. **G. gelatinosa** Kütz. Phyc. Gener. 174 (1843); Tab. Phyc. i. (1845–9), 15–16, t. 20, f. vi. *b*; Rabenh. Flor. Europ. Alg. ii. 39; W. et G. S. West, *l.c.*

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The integuments were very fine, and occasionally of a yellowish colour.

AMBACA.—Alga rupestris, latas plagas rupium cavernæ Puri-Cacarambola internarum colore viridissimo tingens; Oct. 1856. No. **154**. .

2. **G. punctata** Näg. Gatt. einz. Alg. 51, t. i. F, f. 6 (1849); W. et G. S. West in Journ. Bot. 1897, p. 302.

GOLUNGO ALTO.—Cum *G. rupestri*, ad saxa mollia juxta cataractam riv. Coango prope Sange, pone domicil. Domini Velho Castro; Sept. 1856. No. **134**.

3. **G. rupestris** Kütz. Tab. Phyc. i. (1845–9), 17–18, t. 22, f. ii.; Rabenh. Flor. Europ. Alg. ii. 47; W. et G. S. West, *l.c.*

GOLUNGO ALTO.—Cum *G. punctata*, ad saxa mollia juxta cataractam riv. Coango prope Sange; Sept. 1856. No. **134**. Eodem loc. prope Mata do Velho Castro; Sept. 1856. No. **278**.

5. **CHROOCOCCUS** Näg. (1849).

1. **C. minutus** Näg. Gatt. einz. Alg. 46 (1849); W. et G. S. West, *l.c.*

Protococcus minutus Kütz. Phyc. Gener. 168 (1843).

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

2. **C. turgidus** Näg., *l.c.* (1849); W. et G. S. West, *l.c.*

Protococcus turgidus Kütz. Tab. Phyc. i. (1845–9), 5, t. 6.

HUILLA.—In paludibus exsiccandis; April 1860. No. **176**.

3. **C. pallidus** Näg., *l.c.*, t. i. A, fig. 2 (1849); W. et G. S. West, *l.c.*

HUILLA.—In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. **15**.

4. **C. schizodermaticus** West in Journ. R. M. S. Dec. 1892, 742, t. x. fig. 61–63; in Journ. Linn. Soc. xxx. 275, t. xvi. f. 19 (1894).

Var. **badio-purpureus** W. et G. S. West in Journ. Bot. 1897, p. 302.

GOLUNGO ALTO.—Inter *Scytonema insigne*, ad rupes madidas in umbrosis juxta rivum Coango inter Sange et Undelle; May 1856. No. **5**. Ad rupes juxta riv. Coango (N-della), crustam viscoso-cartilagineam fusco-badiam formans, Collematis thallum fingens; June 1856. Nos. **139** and **140**.

Welwitsch contributed to the Journal of Travel and Natural History, vol. i. pp. 22–36 (1868), a paper entitled "The Pedras Negras of Pungo Andongo in Angola," in which he shows that the prolific growth of a subaërial alga is the cause of one of the main features of the country, as it gives such a peculiar aspect to the mountains that they are known as the "black rocks." He writes that it is "probably a non-described species of the prolific genus *Scytonema*, which in that situation during the rainy season generates and multiplies so rapidly that the upper portions of the

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mountains are covered with it in a very short time. . . . Soon after the hot season has set in, at the end of May, when the horizon above the Præsidium is generally clear and bright, the black plantlets begin to discolour with the intense heat. They gradually become dry and brittle until they peel off altogether by-and-by, after which the rocks lose their sombre black aspect, and reappear in their natural grey or grey-brownish colour before the succeeding spring." Welwitsch named this plant *Scytonema chorographicum*, and gave a figure which is hardly characteristic. We have described it as *Scytonema Myochrous* var. *chorographicum* (Journ. Bot. 1897, p. 265); see *ante*, p. 371. Mixed with it is a quantity of *Dichothrix gypsophila*. He states that "the wonderful growth of *Scytonema* in such immense quantities is not confined to the mountain ridge of the Præsidium. . . . In proof of this fact, I may refer to the damp sandy upper valley of the Cuanza River, where a species of *Scytonema* is abundant, frequently extending across the wide meadows, closely spread like a net over the soil, intergrown with the other herbs and smaller shrubs. Through its hygroscopic nature it eagerly absorbs the atmospheric moisture during the dewy nights, affording by this means a refreshing protection to the roots of many other and larger plants during the glowing heat of the following day. The growth and thriving of the numerous small phanerogamous plants in these places is conditional on the co-presence of the prolific *Scytonema*." This second "*Scytonema*" alluded to by Welwitsch is *Porphyrosiphon Notarisii*, one of the *Vaginarieæ*; see *ante*, p. 375.

A parallel to this phenomenon is found on the sandy heaths of the south and some parts of the north of England. At the drier and hotter periods of the year, thickly-matted sheets of *Zygnema ericetorum* are to be found extending over wide patches of almost bare sand, round such plants as *Drosera*, *Carices*, etc. These interlacing masses have great absorptive capacity, greedily taking up water; it is also highly probable that they protect and render the growth of other plants more possible by regulating the moisture of the surface soil. It is interesting to note that *Zygnema ericetorum* is found intermixed in small quantity with the *Porphyrosiphon Notarisii* which covers such extensive areas in Angola. (Ex Journ. Bot. 1897, pp. 303, 304.)

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DIATOMACEÆ.

DETERMINED BY THOMAS COMBER.

1. **NAVICULA** Bory in Dict. Class. D'Hist. Nat. xi. p. 472 (1827); Cleve Syn. Navic. Diat. I., II. in K. Sv. Vet. Ak. Handl. xxvi., xxvii. (1894–95).

1. **N. cuspidata** Kuetz. Bacillar. p. 94. t. iii. f. 24, 37 (1844); Cleve, *op. cit.*, I. p. 109 (1894).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**.

Var. **ambigua** Cleve, *op. cit.*, I. p. 110 (1894).

Navicula ambigua Ehrenb. Verbreit. in Berlin, Abhand. K. Pr. Ak. 1843, t. II. ii. f. 9.

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**. Rio Mûio; 5 Feb. 1855. No. **147**.

2. **N. Perrotettii** Cleve, *op. cit.*, I. p. 110. t. III. f. 12 (1894).

Craticula Perrotettii Grun. in Reise Novara. Bot. I. Algæ p. 20. t. I. f. 21 (1867).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**. Rio Mûio; 5 Feb. 1855. No. **147**.

3. **N. atomoides** Grun. in V. Heurck Syn. t. xiv. f. 12–14 (1880).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

4. **N. Rotæana** V. Heurck Syn. t. xiv. f. 17–19 (1880); Cleve, *op. cit.*, I. 128 (1894).

Stauroneis Rotœana Rabenh. in Hedwigia I. p. 103. t. xiii. f. 7 (1856).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

5. **N. mutica** Kuetz. Bacillar. p. 93. t. iii. f. 32 (1844).

Var. **Goeppertiana** V. Heurck Syn. t. x. f. 18, 19 (1880), p. 95 (1885).

Stauroneis Goeppertiana Bleisch in Rabenh. Alg. Eur. No. 1183 (1861); Rabenh. Fl. Eur. Alg. p. 248 (1864).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

6. **N. Pupula** Kuetz. Bacillar. p. 93. t. xxx. f. 40 (1844).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**. Rio Mûio; 5 Feb. 1855. No. **147**.

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7. **N. (Diadesmis) confervacea** Grun. in V. Heurck Syn. t. xiv. f. 36 (1880).
Diadesmis confervacea Kuetz. Bacillar. p. 109. t. xxx. f. 8 (1844).
PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda; March 1857. No. **130**.

8. **N. (Diadesmis) gallica** V. Heurck Syn. p. 108 (1885).
Diadesmis gallica W. Smith in Ann. Mag. Nat. Hist. Ser. 2. xix. p. 11. t. ii. f. 16 (1857). *Mastogloia?* (*Diadesmis*) *gallica* Cleve, *op. cit.*, II. 150 (1895).
GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**. Rio Mûio; 5 Feb. 1855. No. **147**.

9. **N. Crucicula** Donkin Brit. Diat. p. 44. t. vi. f. 14 (1871).
Stauroneis Crucicula W. Smith Br. Diat. I. p. 60. t. xix. f. 192 (1853).
GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

10. **N. gibbula** Cleve, *op. cit.*, I. p. 140. t. v. f. 17 (1894).
GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

11. **N. pelliculosa** Hilse in Rabenh. Alg. Eur. No. 1265 (1862); Rabenh. Fl. Eur. Alg. p. 187 (1868).
GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854 No. **146**.

12. **N. cryptocephala** Kuetz. Bacillar. p. 95. t. iii. f. 26 (1844).
GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

13. **N. veneta** Kuetz. Bacillar. p. 95. t. xxx. f. 76 (1844).
Var. **pumila** Grun. in V. Heurck Syn. p. 5. t. viii. f. 7, t. xiv. f. 35 (1880–84) (*N.* (*veneta* var. ?) *pumila*).
N. cryptocephala Kuetz. var. *pumila* Cleve, *op. cit.*, II. p. 14 (1895).
GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

14. **N. rhynchocephala** Kuetz. Bacillar. t. xxx. f. 35 (1844).
Var. **amphiceros** Cleve, *op. cit.*, II. p. 15 (1895).
N. amphiceros Kuetz. Bacillar. p. 95. t. iii. f. 39 (1844).
GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

15. **N. slesvicensis** Grun. in V. Heurck Syn. t. vii. f. 28, 29 (1880).
N. viridula Kuetz. var. *slesvicensis* Grun. in V. Heurck Syn. p. 84 (1885).
GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

16. **N. humilis** Donkin Brit. Diat. p. 67. t. x. f. 7 (1873).
GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

17. **N. cincta** Kuetz. fide V. Heurck Syn. t. vii. f. 13, 14 (1880); p. 82 (1885).
Pinnularia cincta Ehrenb. Microgeol. t. x. ii. f. 6 (1854).
GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

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18. **N. radiosa** Kuetz. Bacillar. p. 91. t. iv. f. 23 (1844).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147.**

19. **N. oblonga** Kuetz. Bacillar. p. 97. t. iv. f. 21 (1844).
Frustulia oblonga Kuetz. Alg. Dec. No. 71 (1833).
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146.**

20. **N. dicephala** W. Smith Br. Diat. I. p. 87. t. xvii. f. 157 (1853).
Pinnularia dicephala Ehrenb. in Berlin, Ber. K. Pr. Ak. 1837. p. 45 ; Infusionsth. p. 185 (1838).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147.**

21. **N. lanceolata** Ehrenb. Infusionsth. p. 185 (1838).
Frustulia lanceolata Ag. in Flora x. p. 626 (1827).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. 147.

22. **N. anglica** Ralfs in Pritchard Infusoria p. 900 (1861).
N. tumida W. Smith Br. Diat. I. p. 53. t. xvii. f. 146 (1853).
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146.** Rio Mûio ; 5 Feb. 1855. No. **147.**

23. **Navicula (Schizonema) mollis** Cleve Syn. Navic. Diat. II. in K. Sv. Vet. Ak. Handl. xxvii. 3. p. 26 (1895).
Schizonema molle W. Smith Brit. Diat. II. p. 77. t. lviii. f. 365 (1856).
LOANDA.—In company with minute plants of *Enteromorpha* on the apices of leaves of *Zostera nana* in the Atlantic Ocean, Praia (shore) de Zamba grande, near Loanda ; 3 July 1858. No. **196.**
Welwitsch's specimen probably belongs to this species.

2. **CALONEIS** Cleve Syn. Navic. Diat. II. in K. Sv. Vet. Ak. Handl. xxvii. 3. p. 46 (1895).

1. **C. fasciata** Cleve, *l.c.*, p. 50 (1895).
Navicula fasciata Lagerst. Sötv. Diat. Spetsb. in Bih. K. Sv. Vet. Ak. Handl. I. 14. p. 34. t. ii. f. 11 (1873).
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146.** Rio Mûio ; 5 Feb. 1855. No. **147.**

2. **C. Silicula** Cleve, *l.c.*, p. 51.
Navicula Silicula Ehrenb. Verbreit. in Berlin, Abhand. K. Pr. Ak. 1843, p. 419 (131).
Var. **ventricosa** Cleve, *l.c.*, p. 52.
Navicula ventricosa Ehrenb. in Berlin, Abhandl. K. Pr. Ak. 1830. p. 67.
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146.**

3. **C. amphisbæna** Cleve, *l.c.*, p. 58.
Navicula amphisbæna Bory in Encycl. Méthod. Zoophytes p. 565 (1824).
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146.**

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3. **NEIDIUM** Pfitzer Bau u. Entw. d. Bacillar. in Hanstein Bot. Abhandl. Bonn, I. ii. p. 39 (1871); Cleve Syn. Navic. Diat. I. in K. Sv. Vet. Ak. Handl. xxvi. 2, p. 67 (1894).

1. **N. affine** Cleve, *loc. cit.*, p. 68 (1894).

Navicula affinis Ehrenb. Verbreit. in Berlin, Abhandl. K. Pr. Ak. 1843. p. 417 (129). t. II. ii. f. 17, etc.

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**.

4. **ANOMŒONEIS** Pfitzer Bau u. Entw. d. Bacillar. in Hanstein Bot. Abhandl. Bonn. I. ii. p. 77 (1871); Cleve Syn. Navic. Diat. II. in K. Sv. Vet. Ak. Handl. xxvii. 3. p. 5 (1895).

1. **A. sphærophora** Pfitz., *loc. cit.*, p. 77. t. iii. f. 10 (1871).

Navicula sphærophora Kuetz. Bacillar. p. 95. t. iv. f. 17 (1844).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**. Rio Mûio; 5 Feb. 1855. No. **147**.

2. **A. sculpta** Cleve, *op. cit.*, II. p. 6 (1895).

Navicula sculpta Ehrenb. Microgeol. t. x. i. f. 5 (1854).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**.

5. **DIPLONEIS** Ehrenb. in Berlin, Ber. K. Pr. Akad. 1844. p. 84; Cleve Syn. Navic. Diat. I. in K. Sv. Vet. Ak. Handl. xxvi. 2. p. 76 (1894).

1. **D. elliptica** Cleve, *op. cit.*, p. 92 (1894).

Navicula elliptica Kuetz. Bacillar. p. 98. t. xxx. f. 55 (1844).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**.

2. **D. ovalis** Cleve, *op. cit.*, p. 92 (1894).

Pinnularia ovalis Hilse in Breslau, Schles. Ges. Vaterl. Kultur. 1860, p. 82.

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* var. *obcordata* Engl. (cf. Welw. Herb. No. 215) at the sides of the river Cuige near Quibinda; March 1857. No. **130**.

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**.

6. **STAURONEIS** Ehrenb. Verbreit. in Berlin, Abhandl. K. Pr. Ak. 1843. p. 422 (134); Cleve Syn. Navic. Diat. I. in K. Sv. Vet. Ak. Handl. xxvi. 2. p. 142 (1894).

1. **S. Crucicula** Cleve, *loc. cit.*, p. 151 (1894).

Schizostauron Crucicula Grun. ex Cleve in K. Sv. Vet. Ak. Handl. xviii. 5. p. 16. t. iii. f. 44 (1881).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

7. **PINNULARIA** Ehrenb. in Berlin, Ber. K. Pr. Akad. 1840 p. 213; Cleve Syn. Navic. Diat. II. in K. Sv. Vet. Ak. Handl. xxvii. 3. p. 71 (1895).

1. **P. subcapitata** Greg. in Quart. Journ. Micr. Sci. iv. p. 9. t. I. f. 30 (1856).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

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2. **P. microstauron** Cleve, *op. cit.*, II. p. 77 (1895).
Stauroptera microstauron Ehrenb. Verbreit. in Berlin, Abhandl. K. Pr. Ak. 1843. p. 423. t. 1. iv. f. 1.
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146**.

3. **P. Legumen** Ehrenb. Verbreit. in Berlin, Abhandl. K. Pr. Ak. 1843. p. 384. t. IV. i. f. 7 ; Cleve, *op. cit.*, II. p. 78 (1895).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

4 **P. borealis** Ehrenb. Verbreit. in Berlin, Abhandl. K. Pr. Ak. 1843. t. I. ii. f. 6 ; Cleve, *op. cit.*, II. p. 80 (1895).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

5. **P. gibba** W. Smith Brit. Diat. I. t. xix. f. 180 (1853) ; Cleve, *op. cit.*, II. p. 82 (1895).
Stauroptera gibba Ehrenb. Verbreit. in Berlin, Abhandl. K. Pr. Ak. 1843. t. I. ii. f. 3.
PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda ; March 1857. No. **130**.

6. **P. paulensis** Grunow ex Cleve, *op. cit.*, II. p. 86. t. I. f. 20 (1895).
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146**. Rio Mûio ; 5 Feb. 1855. No. **147**.

7. **P. Dactylus** Ehrenb. Verbreit. in Berlin, Abhandl. K. Pr. Ak. 1843. p. 420 (132). t. IV. i. f. 3 ; Cleve, *op. cit.*, II. p. 90 (1895).
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146**.

8. **GYROSIGMA** Hassall Brit. Freshwater Algæ p. 435 (1845) ; Cleve Syn. Navic. Diat. I. in K. Sv. Vet. Ak. Handl. xxvi. 2. p. 112 (1894).
1. **G. acuminatum** Cleve, *loc. cit.*, p. 114 (1894).
Frustulia acuminata Kuetz. Syn. Diat. in Linnæa viii. p. 555, t. xiv. f. 36 (1833).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

2. **G. Kuetzingii** Cleve, *loc. cit.*, p. 115 (1894).
Pleurosigma Kuetzingii Grun. in Wien, Verh. k. k. zool. bot. Ges. x. p. 561. t. vi (4). f. 3 (1860).
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146**. Rio Mûio ; 5 Feb. 1855. No. **147**.

9. **GOMPHONEMA** Ag. Syst. Alg. p. 11 (1824) ; Cleve Syn. Navic. Diat. I. in K. Sv. Vet. Ak. Handl. xxvi. 2. p. 178 (1894).
1. **G. parvulum** V. Heurck Syn. t. xxv. f. 9 (1880), p. 125 (1885).
Sphenella ? parvula Kuetz. Bacillar. p. 83. t. xxx. f. 63 (1844).
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146**.

2. **G. Lagenula** Kuetz. Bacillar. p. 85. t. xxx. f. 60 (1844) ; V. Heurck Syn. t. xxv. f. 7, 8 (1880).

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GOLUNGO ALTO.—In company with the variety figured in V. Heurck's Synops. t. xxv. f. 7; Rio Mûio; 5 Feb. 1855. No. **147**. A rather broad form; on small shells in ponds near Sange; Dec. 1854. No. **146**.

Var. **lata** Comber, var. nov.

Much broader and shorter than the typical form, and so nearly symmetrical that it might at first sight be mistaken for a *Navicula*. Many may regard it as a distinct species; in which case it might be named **G. Welwitschii** Comber.

LIBONGO.—Very plentiful, in company with *Wolffia*, in an unfinished shaft of a coal mine above Banza de Libongo; Sept. 1858. No. **137**.

3. **G. intricatum** Kuetz. Bacillar. p. 87. t. ix. f. 4 (1844).

Var. **pumila** Grun. in V. Heurck Syn. t. xxiv. f. 35, 36 (1880).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

4. **G. dichotomum** Kuetz. Syn. in Linnæa viii. p. 569. t. xv. f. 48 (1833).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**.

5. **G. Vibrio** Ehrenb. Verbreit. in Berlin, Abhandl. K. Pr. Ak. 1843. p. 416 (128). t. II. i. f. 40.

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda; March 1857. No. **130**.

6. **G. gracile** Ehrenb. Infusionsth. p. 217. t. xviii. f. 3 (1838).

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda; March 1857. No. **130**.

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**.

Var. **naviculoides** Grun. in V. Heurck Syn. t. xxiv. f. 13 (1880).

Gomphonema naviculoides W. Sm. Brit. Diat. II. p. 98 (1856).

G. gracile var. *naviculacea* Cleve, *loc. cit.*, I. p. 183 (1894).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**.

7. **G. commutatum** Grun. in V. Heurck Syn. t. xxiv. f. 2 (1880).

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda; March 1857. No. **130**.

8. **G. oxycephalum** Cleve, *loc. cit.*, I. p. 187. t. v. f. 10 (1894).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

9. **G. olivaceum** Kuetz. Bacillar. p. 85. t. vii. f. 13, 14 (1844).

Echinella olivacea Lyngb. Tent. Hydr. Dan. p. 209. t. 70. f. C, 1–3.

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda; March 1857. No. **130**.

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**.

10. **G. tenellum** Kuetz. Bacillar. p. 84. t. viii. f. 8, b (1844).

G. olivaceum var. *tenellum* Cleve, *loc. cit.*, I. p. 188 (1894).

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda; March 1857. No. **130**.

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10. **CYMBELLA** Ag. Conspect. Crit. Diatom. p. 1 (1830); Cleve Syn. Navic. Diat. I. in K. Sv. Vet. Ak. Handl. xxvi. 2. p. 156 (1894).

1. **C. lævis** Naeg. ex Kuetz. Sp. Alg. p. 58 (1849); V. Heurck Syn. t. iii. f. 7 (1880), p. 62 (1885).

GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

2. **C. stauroneiformis** Lagerst. Sötv. Diat. Spetsb. in Bih. K. Sv. Vet. Ak. I. 14. p. 45. t. I. f. 15 (1873).

GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

3. **C. lacustris** Cleve, *loc. cit.*, p. 167 (1894).

Schizonema lacustre Ag. Syst. Alg. p. 10 (1824). *Encyonema Ungeri* Grun. ex A. Schmidt Atlas t. x. f. 63 (1875).

GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

4. **C. prostrata** Cleve, *l.c.*, p. 167 (1894).

Monema prostratum Berk. Glean. Br. Alg. p. 15. t. iv. f. 3 (1833). *Encyonema prostratum* Ralfs in Ann. Mag. Nat. Hist. xvi. p. 111. t. iii. f. 3 (1845).

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda; March 1857. No. **130**.

GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

5. **C. turgida** Greg. in Quart. Journ. Micr. Sci. iv. p. 5. t. I. f. 18 (1856). *Encyonema turgidum* Grun. ex A. Schmidt Atlas t. x. f. 49–53 (1875).

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda ; March 1857. No. **130**.

6. **C. ventricosa** Ag. Consp. Crit. Diat. I. p. 9 (1830)?; Kuetz. Bacillar. p. 80. t. vi. f. 16 (1865).

Encyonema ventricosum V. Heurck Syn. t. iii. f. 15–17, 19 (1880), p. 66 (1885).

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda ; March 1857. No. **130**.

7. **C. turgidula** Grun. ex A. Schmidt Atlas t. ix. f. 23–26 (1875).

Var. **inæqualis** Comber, var. nov.

One end is more produced than the other, so that the valve is sub-claviform.

GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146**. Rio Mûio ; 5 Feb. 1855. No. **147**.

11. **AMPHORA** Ehrenb. in Berlin, Ber. K. Pr. Ak. 1840. p. 205; Cleve Syn. Navic. Diat. II. in K. Sv. Vet. Ak. Handl. xxvii. 2. p. 99 (1895).

1. **A. ovalis** Kuetz. Bacillar. p. 107 (1865).

Frustulia ovalis Kuetz. Synops. in Linnæa viii. p. 539 (1833).

Var. **libyca** Cleve, *loc. cit.*, II. p. 104 (1895).

Amphora libyca Ehrenb., *l.c.*, p. 205 (1840).

GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146**. Rio Mûio ; 5 Feb. 1855. No. **147**.

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Var. **Pediculus** V. Heurck Syn. p. 59 (1885).

Cymbella ? Pediculus Kuetz. Bacillar. p. 80 (1865).

GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146**. Rio Mûio ; 5 Feb. 1855. No. **147**.

2. **A. quadricostata** Rabenh. Süssw. Diatom. t. ix. f. 5 (1853).

A. veneta Cleve, *loc. cit.*, II. p. 118 (1895).

BARRA DO BENGO.—On *Naias* in Lagoa Quifandongo, near Quisequela ; Nov. 1853. No. **135**.

12. **COCCONEIS** Ehrenb. Infusionsthierchen, p. 193 (1838); Cleve Syn. Navic. Diat. II. in K. Sv. Vet. Ak. Handl. xxvii. 2. p. 168 (1895).

1. **C. Placentula** Ehrenb., *l.c.*, p. 194 (1838).

GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146**. Rio Mûio ; 5 Feb. 1855. No. **147**.

13. **ACHNANTHIDIUM** Kuetz. Bacillar. p. 75 (1844); Heiberg Consp. crit. Diat. Danic. p. 118 (1863); Cleve Syn. Navic. Diat. II. in K. Sv. Vet. Ak. Handl. xxvii. 2. pp. 164, 191 (1895) (subgenus).

1. **A. lanceolatum** Bréb. ex Kuetz. Sp. Alg. p. 54. 1849.

Var. **Haynaldii**.

Achnanthes Haynaldii Schaarschm. Sp. Phyc. Aequat. in Kanitz Magy. Növénytani Lapok. v. p. 20 (1881). *A. lanceolata* var. *Haynaldii* Cleve in Diatomiste II. p. 99. t. vii. f. 14 (1894).

GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

2. **A. delicatulum** Kuetz. Bacillar. p. 75. t. iii. f. 21 (1844).

GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

3. **A. Hauckii**.

Achnanthes Hauckiana Grun. in Cleve et Grun. Arct. Diat. in K. Sv. Vet. Ak. Handl. xvii. 2. p. 21 (1880). *A. Hauckii* Grun. in V. Heurck Syn. t. xxvii. f. 14, 15 (1880).

GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

14. **MICRONEIS** Cleve Syn. Navic. Diat. II. in K. Sv. Vet. Ak. Handl. xxvii. 2. pp. 164, 187 (1895) (subgenus).

1. **M. exigua**.

Achnanthes exigua Grun. in Cleve et Grun. Arct. Diat. in K. Sv. Vet. Ak. Handl. xvii. 2. p. 21 (1880).

GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

15. **NITZSCHIA** Hassall Brit. Freshwater Algæ p. 435 (1845); Grun. in Cleve et Grun. Arct. Diat. in K. Sv. Vet. Ak. Handl. xvii. 2. p. 67 (1880).

1. **N. Tryblionella** Hantzsch in Rabenh. Alg. Eur. No. 984 (1860); Cleve et Grun. Arct. Diat. in K. Sv. Vet. Ak. Handl. xvii. 2. p. 69 (1880).

Tryblionella Hantzschiana Grun. in Wien, Verh. k. k. zool. bot. Ges. xii. p. 552. t. xviii (12). f. 29 (1862).

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Var. **Victoriæ** Grun. in Cleve et Grun. Arct. Diat., *l.c.*, p. 69 (1880).

Tryblionella Victoriæ Grun. in Wien, Verh. k. k. zool. bot. Ges. xii. p. 553. t. xviii (12). f. 34 (1862).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

Var. **calida** V. Heurck Syn. p. 171 (1885).

N. calida Grun. in Cleve et Grun. Arct. Diat., *l.c.*, p. 75 (1880); V. Heurck Syn. t. lix. f. 4, 5 (1882).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

2. **N. perversa** Grun. in Cleve et Grun. Arct. Diat., *l.c.*, p. 70 (1880).

BARRA DO BENGO.—On *Naias* in Lagoa Quifandongo, near Quisequele; Nov. 1853. No. **135**.

3. **N. hungarica** Grun. in Wien, Verh. k. k. zool. bot. Ges. xii. p. 568, t. xviii (12). f. 31 (1862).

BARRA DO BENGO.—On *Naias* in Lagoa Quifandongo, near Quisequele; Nov. 1853. No. **135**.

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

4. **N. dubia** W. Smith Brit. Diat. I. p. 41 (1853).

BARRA DO BENGO.—On *Naias* in Lagoa Quifandongo, near Quisequele; Nov. 1853. No. **135**.

5. **N. Petitiana** Grun. in Cleve et Grun. Arct. Diat., *l.c.*, p. 104 in adnot. (1880).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

6. **N. dissipata** Grun. in Cleve et Grun. Arct. Diat., *l.c.*, p. 90 (1880).

Synedra dissipata Kuetz. Bacillar. p. 64. t. xiv. f. 3 (1844).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

7. **N. vermicularis** Hantzsch in Rabenh. Alg. No. 889 (1859); Pritchard Infus. p. 781 (1861).

Synedra vermicularis Kuetz. Bacillar. p. 67. t. iv. fig. 35 (1844).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

8. **N. linearis** W. Smith Br. Diat. I. p. 39. t. xiii. f. 110 (1853).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**. Rio Mûio; 5 Feb. 1855. No. **147**

9. **N. Palea** W. Smith Br. Diat. II. p. 89 (1856).

Synedra Palea Kuetz. Bacillar. p. 63. t. iii. 27, iv. 3 (1844).

LIBONGO.—Rare, in company with *Wolffia*, in an uncompleted shaft of a coal mine above Banza de Libongo; Sept. 1858. No. **137**.

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

Var. **debilis** Grun. in Cleve et Grun. Arct. Diat., *l.c.*, p. 96 (1880).

Synedra debilis Kuetz. Bacillar. p. 65. t. iii. f. 45 (1844).

BARRA DO BENGO.—On *Naias* in Lagoa Quifandongo, near Quisequele; Nov. 1853. No. **135**.

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10. **N. communis** Rabenh. Alg. n. 949 (1859); Grunow in Wien, Verh. k. k. zool. bot. Ges. xii. p. 578. t. xviii (12). f. 18 (1862).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**.

11. **N. amphibia** Grun. in Wien, Verh. k. k. zool. bot. Ges. xii. p. 574. t. xviii (12). f. 23 (1862).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**.

12. **N. Frustulum** Grun. in Cleve et Grun. Arct. Diat., *l.c.*, p. 98 (1880).

Synedra Frustulum Kuetz. Bacillar. p. 63. t. xxx. f. 77 (1844).

Var. **Hantzschiana**.

N. Hantzschiana Rabenh. in Hedwig. II. p. 40. t. vi. f. 6 (1860). *N.* (*Frustulum* var.) *Hantzschiana* V. Heurck. Syn. Atlas p. 72. t. 69. f. 1. 2 (1880–84).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

16. **HANTZSCHIA** Grun. in Cleve et Grun. Arct. Diat. in K. Sv. Vet. Ak. Handl. xvii. 2. p. 103 (1880).

1. **H. amphioxys** Grun., *l.c.*, p. 103 (1880).

Eunotia amphioxys Ehrenb. Verbreit. in Berlin, Abhandl. K. Pr. Ak. 1843. p. 413 (125). t. I. i. f. 26.

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

17. **SURIRELLA** Turpin in Paris, Mém. Mus. Hist. Nat. xvi. p. 361 (1828). *Suriraya* Pfitzer Bau u. Entw. Bacillar. in Hanst. Bot. Abhandl. I. p. 107 (1871).

1. **S. biseriata** Bréb. Alg. Env. Falaise p. 53. t. vii. (1835).

GOLUNGO ALTO.—A small form with scattered apiculi; on small shells in ponds near Sange; Dec. 1854. No. **146**. Oval form with scattered apicula; Rio Mûio; 5 Feb. 1855. No. **147**.

2. **S. splendida** Kuetz. Bacill. p. 62. t. vii. f. 9 (1844).

Navicula splendida Ehrenb. in Berlin, Abhandl. K. Pr. Ak. 1831. p. 81; Infusionsth. p. 186. t. xiv. f. 1 (1838).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**. Rio Mûio; 5 Feb. 1855. No. **147**.

3. **S. tenera** Greg. in Quart. Journ. Micr. Sci. iv. p. 11. t. I. f. 38 (1856).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**.

4. **S. constricta** Ehrenb. Microgeol. t. xiv. f. 37 (1854).

Navicula? constricta Ehrenb. Infusionsth. p. 188. t. xxi. f. 17 (1838).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

Var. **arcta**.

S. arcta A. Schm. Atlas t. xxiii. f. 23–25 (1875).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

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5. **S. augusta** Kuetz. Bacillar. p. 61. t. xxx. f. 52 (1844).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

Var. **apiculata** Grun. in Wien, Verh. k. k. zool. bot. Ges. xii. p. 455. t. vii. (10). f. 8 (1862).
S. apiculata W. Smith Br. Diat. II. p. 88 (1856).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

6. **S. Moelleriana** Grun. in Moeller, Typen Platten 2–3–4 (Date ?) ; A. Schmidt Atlas t. xxiii. f. 36, etc. (1875).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

18. **CYMATOPLEURA** W. Smith in Ann. Mag. Nat. Hist. Ser. 2. vii. p. 12 (1851).
1. **C. Solea** W. Smith, *l.c.*, p. 12. t. iii. f. 9 (1851).
Surirella Solea Kuetz. Bacillar. p. 60. t. iii. f. 61 (1844).
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146**. Rio Mûio, 5 Feb. 1855. No. **147**.

19. **DIATOMA** DC. Flor. Franç. II. p. 48 (1805); Heib. Consp. Crit. Diat. Danic. p. 55 (1863).
1. **D. elongatum** Ag. Syst. Alg. p. 4 (1824).
Var. **Ehrenbergii** V. Heurck Syn. p. 160 (1885).
Diatoma Ehrenbergii Kuetz. Bacill. p. 48. t. xvii. f. 18 (1844).
D. grande W. Smith Br. Diat. II. p. 39. t. xl. f. 310 (1856).
BARRA DO BENGO.—On *Naias* in Lagoa Quifandongo, near Quisequele ; Nov. 1853. No. **135**.

20. **SYNEDRA** Ehrenb. in Berlin, Abhand. 1830. p. 40; Infusionsth. p. 210 (1838); Kirchn. in Cohn Krypt.-Flor. Schles. II. i. p. 207 (1878).
1. **S. Ulna** Ehrenb. Infusionsth. p. 211. t. xvii. f. 1 (1838).
Bacillaria Ulna Nitzsch Beitr. z. Infus. p. 99. t. v., in Halle, Neue Schrift. Naturf. Ges. III. i. (1817).
PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda ; March 1857. No. **130**.
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146**. In company with a short broad form in which the blank is often unilateral, and also with a constricted form ; Rio Mûio, 5 Feb. 1855. No. **147**.

2. **S. splendens** Kuetz. Bacillar. p. 66. t. xiv. f. 16 (1844) ; V. Heurck. Syn. t. xxxviii. f. 2 (1880–84).
GOLUNGO ALTO.—On small shells in ponds near Sange ; Dec. 1854. No. **146**. Rio Mûio ; 5 Feb. 1855. No. **147**.

3. **S. Acus** Kuetz. Bacillar. p. 68. t. xv. f. 7 (1844).
Var. **delicatissima** Grun. in V. Heurck Syn. p. 151 (1885).
S. delicatissima W. Smith Br. Diat. I. p. 72. t. xii. f. 94 (1853).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

4. **S. affinis** Kuetz. Bacillar. p. 68. t. xv. f. 6, etc. (1844).

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GOLUNGO ALTO.—The freshwater form *S. putealis* O'Meara Rep. Ir. Diat. in Dublin, Proc. R. Ir. Acad. Sci. Ser. 2. II. p. 312. t. xxviii. f. 41 (1876); Rio Mûio; 5 Feb. 1855. No. **147**.

21. **EPITHEMIA** Kuetz. Bacillar. p. 33 (1844). *Epithema* Bréb. Consid. s. l. Diat. p. 16 (1838).

1. **E. gibba** Kuetz. Bacillar. p. 35. t. iv. f. 22 (1844).

Navicula gibba Ehrenb. in Berlin, Abhandl. K. Pr. Ak. 1830. p. 68; Infusionsth. p. 184. t. xiii. f. 19 (1838).

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda; March 1857. No. **130**.

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**. Rio Mûio; 5 Feb. 1855. No. **147**.

Var. **ventricosa** Grun. in V. Heurck Syn. t. xxxii. f. 4, 5 (1880); p. 139 (1885).

E. ventricosa Kuetz. Bacillar. p. 35. t. xxx. f. 9 (1844).

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**. Rio Mûio; 5 Feb. 1855. No. **147**.

Var. **parallela** Grun. in V. Heurck Syn. t. xxxii. f. 3 (1880); p. 139 (1885).

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

Var. **ovalis** Comber, var. nov.

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**

Var. **clavata** Comber, var. nov.

E. clavata J. L. B. MS. in Coll. Roy. Micr. Soc. No. 954.

GOLUNGO ALTO.—Rio Mûio; 5 Feb. 1855. No. **147**.

2. **E. gibberula** Kuetz. Bacillar. p. 35. t. xxix. f. 54, t. xxx. f. 3 (1844).

Eunotia gibberula Ehrenb. Verbreit. in Berlin, Abhandl. K. Pr. Ak. 1843. p. 414 (126). t. III. iv. f. 8.

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda; March 1857. No. **130**.

GOLUNGO ALTO.—On small shells in ponds near Sange; Dec. 1854. No. **146**. Rio Mûio; 5 Feb. 1855. No. **147**.

22. **EUNOTIA** Ehrenb. in Berlin, Ber. K. Pr. Ak. Wissensch. II. 44 (1837); Grun. in Wien, Verh. k. k. zool. bot. Ges. xii. p. 331 (1862).

1. **E. Arcus** Ehrenb. in Berlin, Ber. K. Pr. Ak. 1837. p. 45; Infusionsth. p. 191. t. xxi. f. 22 (1838).

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda; March 1857. No. **130**.

2. **E. major** Rabenh. Fl. Eur. Alg. I. p. 72 (*majus*) (1864).

Himantidium majus W. Smith Br. Diat. II. p. 14. t. xxxiii. f. 286 (1856).

PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda; March 1857. No. **130**.

BARRA DO BENGO.—On *Naias* in Lagoa Quifandongo, near Quisequele; Nov. 1853. No. **135**.

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3. **E. pectinalis** Rabenh. Fl. Eur. Alg. I. p. 73 (1864).
Conferva pectinalis Dillw. Brit. Conferv. t. 24 (1809).
PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda ; March 1857. No. **130**.

4. **E. minor** V. Heurck Syn. Atlas p. 36. t. xxxiii. f. 20, 21 (1880).
Himantidium minus Kuetz. Bacillar. p. 39. t. xvi. f. 10 (1844).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

5. **E. Eulensteinii** Comber, sp. n.
Diatoma Eulensteinii Welw. in sched.
It may possibly be identical with *Desmogonium guianense* Ehrenb. [in Schomb. Reisen in Brit. Guian. III. p. 539 (1848)], but it has not the distinctive character upon which that genus was founded.
I find no *Diatoma* in the material; and, as this species is the most characteristic form present, I take it to be what is meant. There are two forms:—
f. biconstricta, with a central inflation.
f. constricta, without a central inflation.
PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda ; March 1857. No. **130**.

23. **TABELLARIA** Ehrenb. in Berlin, Ber. K. Pr. Ak. 1840. p. 217.
1. **T. flocculosa** Kuetz. Bacillar. p. 127. t. xvii. f. 21 (1844).
Conferva flocculosa Roth. Catalect. Botan. I. p. 192. t. iv. f. 4, v. f. 6 (1797).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

24. **CERATAULUS** Ehrenb. in Berlin, Ber. K. Pr. Akad. 1843. p. 270; Ralfs in Pritch. Infus. p. 846 (1861).
1. **C. lævis** Ralfs in *op. cit.*, p. 847 (1861).
Biddulphia lævis Ehrenb. Verbreit. in Berlin, Abhandl. K. Pr. Ak. 1843. p. 410 (122).
GOLUNGO ALTO.—Rio Mûio ; 5 Feb. 1855. No. **147**.

25. **MELOSEIRA** Ag. Syst. Alg. pp. xiv. 8 (1824); Kuetz. Bacillar. p. 52 (1844) (*Melosira*).
1. **M. varians** Ag. in Flora x. p. 628 (1827); Consp. Crit. Diat. p. 64 (1832).
PUNGO ANDONGO.—On roots of *Pistia Stratiotes* in the Cuige river near Quibinda ; March 1857. No. **130**.

The following numbers represent material which is insufficient for examination, or in which no Diatoms have been detected:—
HUILLA.—No notes. However, the presence of *Eriocaulon huillense* suggests that the gathering came from elevated swamps near Humpata. etc., and should be compared with Alga No. 15. No. **16**.
LIBONGO.—In company with *Wolffia* in a disused petroleum mine, full of pure water, above Banza de Libongo ; Sept. 1858. No. **129**.

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LOANDA.—Among *Oscillaria* in wooden buckets partially or not continually filled with water in gardens at Loanda; in the country garden of Sr. Dr. Mendes Alfonso; 18 Oct. 1858. No. **127**. Sediment of *Lemna* and *Chara* from the Represa (pond) of Luis Gomez; Feb. 1858. No. **281**. No specimen. Sediment of Infusoria; Represa de Bemposta; 17 June 1858. No. **283**.

GOLUNGO ALTO.—Yellowish-red slimy tufts, sometimes floating in bubbly masses on the surface of ponds, sometimes submerged in company with *Conferva*; remarkable for their metallic lustre in the dry state; only once observed, and then it was common in ponds in the banks of the Cuango river near Sange; in Isidro's Varzea (marshy meadow), July 1857. No. **133**. With *Conferva* in rivulets near Sange; June 1856. No. **160**.

BENGUELLA.—A green Alga, very gregarious, forming yellowish-green scum-like strata over several miles of the ocean about a mile from the coast. Welwitsch records that on the 22nd and 23rd of June 1860, the sea in the Bay of Benguella was for several miles parallel to the coast covered with strata of this Alga; and he hazards the suggestion that it might perhaps have been carried down with the flood out of the river Catumbella. No. **184**.

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LICHENES.

SCRIPSIT EDV. A. WAINIO.

I. DISCOLICHENES.

A. *CYCLOCARPEAE.*

TRIB. I.—PARMELIEÆ.

1. USNEA (Dill.) Pers.

1. **U. barbata** (L.) Ach. ***U. florida** (L.) Wain. Etud. Lich. Brés. I. p. 3.

Var. **comosa** (Ach.) Wain., *l.c.*, p. 5.

HUILLA.—Sterilis ad truncos in summis montium Serra da Xella (3800 ad 5500 ped. s. m.). No. **21** pr. p.

Var. **mollis** (Stirt.) Wain.

LOANDA.—Ad truncos vetustos in sylva primitiva inter Calambe et ostia fluminis Cuanza. No. **68**. Fert. Medulla laxa, KHO non reagens.

Var. **australis** (Fr.) Wain.

U. australis Fr., Syst. Orb. Veg. p. 282 (secund. specim. orig. in herb. Müll.). *U. barbata* v. *australis* Müll. Arg., Lich. Beitr. n. 1066.

PUNGO ANDONGO.—Prope Pedra de Cansambe (2400 ad 3800 ped. s. m.) frequenter ad omnes fere frutices, sed præprimis ad Vellosiarum rupestrium ramulos frequentissima. No. **72**. Fert. Medulla laxa, KHO lutescens.

Var. **subelegans** Wain., *l.c.*, p. 6.

HUILLA.—Ad ramulos arborum in summis montium Serra da Xella (3800 ad 5500 ped. s. m.). No. **21** pr. p. Fert.

2. **U. rigida** Wain., sp. n.

Thallus erectus, rigidus, longitudine circ. 50 ad 100 mm., ramis primariis circ. 0·9 ad 1·5 mm. crassis, ramis omnibus teretibus, glaucescens, verrucis minutissimis albidis subsorediosis creberrimis maxima parte instructus, basi lævigatus, soraliis distinctis destitutus, ramis adventitiis nullis aut sat numerosis circ. 1 ad 5 mm. longis. Stratum myelohyphicum crebre contextum, KHO haud rubescens, jodo passim cærulescens. Ster. Comparabilis cum *U. cornuta* (Flot.) Stirt., Usn. 1881, p. 5 (Müll. Arg., Lich. Beitr. n. 1063, Steiner, Flecht. Brit. Ostafr., p. 213), at thallo neque distincte soredioso, nec passim nigricante, et verrucis minoribus ab ea differt.

PUNGO ANDONGO.—Frequenter ad rupes perpendiculares versus

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austrum spectantes in præruptis ad Calundo (2400 ad 3800 ped. s. m.). No. **71**. *U. lævis* (Eschw.) Nyl., in Benguella a Welwitsch lecta est, ut indicat Nyl., Prodr. Fl. Nov.-Granat. ed. 2. p. 299.

3. **U. arthroclada** Fée. ***U. arthrocladodes** Wain., subsp. n.

Thallus pendulus, demum elongatus, sat rigidus, glaucescens aut partim pallido-glaucescens, ramis primariis circ. 1 ad 0·5 mm. crassis, ramulis 2 ad 30 mm. longis, vulgo circ. 2 ad 3 mm. distantibus, e dichotomia inæquali ortis instructus, cortice sat crebre articulato, maxima parte verruculis cartilagineis thallo concoloribus, minutissimis (lente visibilibus) crebre ornatus, esorediatus. Stratum myelohyphicum crebre contextum, KHO haud reagens. Apothecia numerosa, ramulis lateralibus affixa, circ. 5 ad 7 mm. lata, margine spinuloso, spinis 2 ad 10 mm. longis, disco cæsio-pruinoso, excipulo extus sat lævigato aut leviter rugoso. Thallo crebre cartilagineo-verruculoso et reactione differt ab *U. arthroclada* Fée (Wain., Etud. Lich. Brés. I. p. 10), quæ secundum specimen orig. in herb. Müll. thallo lævigato et medulla KHO rubescente instructa est (in specimine ad Petropolin ab Imperatrice Brasiliæ lecto thallus est lævigatus aut passim parce increbreque cartilagineo-verruculosus et medulla KHO aurantiaco-rubescens).

GOLUNGO ALTO.—Ad arbores in montibus Serra de Alta Queta. No. **69** pr. p.

4. **U. longissima** Ach.

Ad arbores secus flumen Quillu leg. Pechuel-Loesche teste Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 31.

5. **U. angulata** Ach. ***U. goniodes** (Stirt.) Wain., Etud. Lich. Brés. I. p. 12.

LOANDA.—Ad ramulos arborum vetustarum prope ripas fluminis Cuanza fluxu maris visitatas et quondam obtectas. Nos. **67** et **73**. Etiam fert. test. Welwitsch.

GOLUNGO ALTO.—Ad arbores in montibus Serra de Alta Queta. No. **69**. Ster.

Var. **flaccida** (Müll. Arg.) Wain.

U. angulata var. *flaccida* Müll. Arg., Lich. Afr. Trop. (1890), p. 337, secund. specim. orig. in herb. meo.

GOLUNGO ALTO. —Ad arbores in montibus Serra de Alta Queta. No. **69** pr. p. Ster.

2. **RAMALINA** Ach.

1. **R. geniculata** Nyl., Mon. Ram. p. 65. pr. p.; Wain., Etud. Lich. Brés. I. p. 15.

GOLUNGO ALTO.—Ad ramulos languescentes in sylvis raris montium Serra de Alta Queta. No. **88**. Fert.

Var. **olivacea** Müll. Arg., Lich. Beitr. n. 128, prope Landana a Pechuel-Loesche lecta est.

2. **R. dendriscoides** Nyl. in Fl. 1876, p. 412.

GOLUNGO ALTO.—Ad ramos inferiores fere horizontales *Edwardiæ luridæ* in sylvis densis Sobati Quilombo et Quiacatubia. No. **84**. Ster.

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MOSSAMEDES IN BENGUELLA.—Frequentissime et cum *Roccella* socialis ad rupes calcareas in maritimis prope Saco de Giraûl, at parcissime fructifera teste Welw. No. **24**.

3. **R. gracilis** (Pers.) Nyl.

R. maculata Müll. Arg., Lich. Beitr. n. 64, 127 (Lich. Schenck. p. 226).

AMBRIZ.—Ad ramulos Celastrinearum aliorumque fruticum in collinis maritimis prope Ambriz. No. **85** pr. p., **90**. Fert. Prope Landana leg. Pechuel-Loesche (Müll. Arg., Lich. Beitr. n. 127).

4. **R. leptosperma** Nyl. in Fl. 1876, p. 412.

AMBRIZ.—Ad ramulos Celastrinearum aliorumque fruticum in collinis maritimis prope Ambriz una cum *R. gracili*. No. **85** pr. p. Fert.

5. **R. Tingitana** Salzm. in Nyl. Mon. Ram. p. 62.

INS. CAPITIS VIRIDIS.—Ad rupes basalticas insulæ S. Vincentii in editioribus montibus (Monte Verde). No. **87**. Ster.

6. **R. Yemensis** (Ach.) Nyl., *l.c.*, p. 46; Wain., Etud. Lich. Brés. I. p. 20.

GOLUNGO ALTO.—Rarius ad ramulos emortuos arborum in sylvis raris edit. montium Serra de Alta Queta. No. **86**. Fert.

7. **R. complanata** (Sw.) Ach.; Wain., *l.c.*, p. 21.

BARRA DO BENGO (DANDE).—Ad ramulos subemortuos Celastrinearum aliorumque fruticum in Praia de S. Thiago ad Oceanum Atlanticum. No. **89**. Fert.

R. denticulata (Eschw.) Nyl. e Landana (leg. Pechuel-Loesche) in Müll. Arg. Lich. Afr. Occ. (Linnæa 1880), p. 82, commemoratur.

8. **R. euphorbiæ** Wain., sp. n.

Thallus sat brevis, circ. 15 ad 35 mm. altus, suberectus, compressus, dichotome aut irregulariter laciniatus, laciniis sublinearibus aut irregularibus, patentibus, apice obtusis aut attenuatis, laciniis primariis circ. 10 ad 2 mm. latis, planis aut subcanaliculatis, crebre reticulato-nervosus, haud papillosus, esorediatus, opacus, cæsio-glaucescens; medulla KHO non reagens. Apothecia circ. 3 ad 10 mm. lata, numerosa, lateralia et marginalia, sessilia aut subpodicellata, primum cupuliformia, demum peltato-applanata. Excipulum extus radiatim crebre reticulato-nervosum. Discus tenuiter pruinosus, carneopallidus. Sporæ oblongæ, leviter curvatæ, apicibus obtusis aut rotundatis, long. 0·012 ad 0·014, crass. 0·004 ad 0·0045 mm. Valde affinis est *R. calicari* Nyl., at thallo opaco subcæsio et sporis leviter curvatis tenuioribusque ab ea differens.

MOSSAMEDES.—Non infreq. ad caules carnosos resinosos *Euphorbiæ decumbentis* Welw. in collinis maritimis prope Mossamedes in Benguella. No. **23**.

R. farinacea (L.) Ach. v. *phalerata* Ach. e Landana (leg. Pechuel-Loesche) in Müll. Arg. Lich. Afr. Occ. (Linnæa 1880), p. 32, commemoratur.

3. **PARMELIA** (Ach.) De Not.

1. **P. olivetorum** Nyl., Fl. 1869, p. 288, Hue, Addend. p. 40.

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Var. **esorediata** Wain. Thallus esorediatus, superne glaucescens, opacus.

GOLUNGO ALTO.—Ad truncos vetustos in Serra de Alta Queta. No. **109** pr. p. In Serra de Mongollo. No. **110**. Etiam fert.

Species *Parmeliæ*, a Müll. Arg. in Lich. Afr. Occ. (Linnæa 1880), p. 32, enumeratæ, ob methodum defectam determinandarum Parmeliarum hujus auctoris hic omittentur.

Var. **sorediosa** Wain. Thallus margine sorediosus, glaucescens, sat opacus.

CAZENGO.—Ad truncos ramulosque *Coffeæ arabicæ* in sylvis editis in Serra de Muxaûla. No. **112**. Ster.

Var. **hyporysalea** Wain. Lojka, Lich. Univ. n. 61 (nomine *P. abessynicæ*; haud Nyl., Fl. 1885, p. 608). Thallus glaucescens, opacus, esorediatus, subtus demum crebre rugulosus, nigricans. Medulla KHO non reagens, $CaCl_2O_2$ rubescens. Apothecia circ. 7 ad 20 mm. lata, perforata, excipulo extus lævigato aut ruguloso. Sporæ long. 0·015 ad 0·018, crass. 0·008 ad 0·010 mm.

HUILLA (3800 ad 5500 ped. s.m.).—Ad ramulos fruticum in regionibus editioribus montis Morro de Lopollo. Nos. **6**, **27**. Ad truncos vetustos arborum in sylvis densioribus ad Lacum Magnum Hippopotamorum sive Ivantâla. No. **26**. Ad ramos arborum in summis rupestribus montis Serra da Xella. No. **28**.

2. **P. nitens** Müll. Arg., Lich. Usamb. (1894) p. 255 (excl. var.), secund. specim. orig. in herb. Müll.

Thallus albidus aut cinereo-albicans, nitidus, esorediatus, isidiis destitutus, subtus lævigatus, nigricans, ad ambitum fuscescens. Reactionibus cum *P. olivetorum* congruit, at sporis minoribus et thallo nitido ab ea differt et forsan est autonoma species. Apothecia circ. 5–15 millim. lata, perforata, excipulo extus sat lævi. Sporæ longit. 0·012 ad 0·013, crass. 0·006 ad 0·007 millim.

HUILLA.—Frequenter ad rupes schistoso-arenosas in sylvaticis editis (5600 ped. s. m.) in Morro de Lopollo. No. **25**.

3. **P. submarginalis** Michx., Fl. Bor.-Am. p. 325; Nyl. in Fl. 1885, p. 607.

GOLUNGO ALTO.—Ad truncos vetustos arborum in Serra de Alta Queta. No. **109** pr. p. Fert.

LOANDA.—Ad truncos e flumine Cuanza ejectos inter Calumbo et ostia fluminis. No. **116**. Fert.

4. **P. melanothrix** (Mont.) Wain., Étud. Brés. I. p. 30.

GOLUNGO ALTO.—Ad ramulos arborum in sylvis editis in Serra de Cungulungulo. No. **108**. Fert.

PUNGO ANDONGO.—Ad Vellosias in rupibus prope Præsidium. No. **111** pr. p. Fert.

5. **P. coralloidea** (Mey. & Flot.) Wain., *l.c.*, p. 33.

INS. PRINCIPIS (in sinu Benin).—Haud infrequens ad basin truncorum præcipue ad *Pentaclethram macrophyllam* in sylvis primævis editioribus in Pico de Papagaio. No. **118**. Ster.

INS. S. JACOBI (Ins. Cap. Virid.).—In regionibus montosis interioribus insulæ S. Jacobi freq. et olim qua *Estrellina* collecta et vendita. No. **117**. Ster.

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6. **P. Abessinica** Nyl. in Krempelh. Lich. Afr. p. 140, Fl. 1885, p. 608; Stizenb., Lich Afr. p. 53.

Ad flumen Kongo legit Ledien, teste Stizenb., *l.c.*

7. **P. Soyauxii** Müll. Arg., Lich. Afr. Occ. (Linnæa 1880) p. 32.

Ad lapides prope Pungo Andongo in Angola lecta a Soyaux, teste Müll. Arg., *l.c.*

8. **P. perforata** (Jacq.) Ach.; Wain., *l.c.*, p. 38.

PUNGO ANDONGO (2400 ad 3800 ped. s. m.).—Ad basin truncorum in sylvis claris prope Præsidium. No. **115**. Ster.

9. **P. sublævigata** Nyl. in Fl. 1885, p. 611; Wain., Etud. Lich. Brés. I. p. 53.

P. Hookeri Tayl. (Müll. Arg. Lich. Beitr. n. 1338) thallo isidioso ab hac specie differt.

PUNGO ANDONGO (2400 ad 3800 ped. s. m.).—Ad Vellosias in rupibus prope Præsidium. No. **111** pr. p. Fert. Ad ramos fruticis Caxinde-candange (i.e. *Myrothamnus flabellifolius* Welw. No. 1279) in rupibus editis prope Guinga Sobati Quibanga. No. **114** pr. p. Ster.

GOLUNGO ALTO.—Ad truncum arboris in sylvis prope Tange. No. **122**. Ster.

10. **P. hypocræa** Wain., sp. n.

Affinis *P. quercinæ* (Willd.) sive *P. tiliaceæ* Nyl., at thallo subtus pallido et reactione thalli ab ea differens. Thallus superne glaucescenti-albidus, inferne pallidus, laciniis circ. 5 ad 1·5 mm. latis, adpressis, crebre lobatis incisisque, axillis lacinularum rotundato-conniventibus, esorediatus, isidiis destitutus, subtus rhizinis brevibus, pallidis, subsimplicibus usque ad marginem instructus, KHO superne non reagens, intus lutescens et demum rubescens, $CaCl_2O_2$ non reagens. Apothecia circ. 5 ad 2 mm. lata, applanato-cupuliformia, imperforata, sessilia, disco rufo, margine fisso aut subintegro, excipulo extus isidioso. Sporæ 8næ, ellipsoideæ, long. 0·012 ad 0·009, crass. 0·007 ad 0·006 mm. Hymenium jodo persistenter cærulescens. Paraphyses arcte cohærentes, neque ramosæ, nec connexæ, clavatæ.

HUILLA (3800 ad 5500 ped. s. m.).—Ad corticem arborum Leguminosarum in sylvis densis juxta flumen Monino. No. **32** pr. p. Fert.

P. leucorhiza Wain. (*P. hypoleuca* in Lich. Ruwenz. p. 40, haud Müll. Arg., Lich. Beitr. n. 1145) thallo tenuiore et reactionibus ab hac specie differt.

11. **P. isidiza** Nyl. in Fl. 1885, p. 612; Wain., Etud. Lich. Brés. I. p. 48.

PUNGO ANDONGO (2400 ad 3800 ped. s. m.).—Ad ramos fruticis Cuxinde-candange (i.e. *Myrothamnus flabellifolius* Welw. No. 1279) in rupibus editis prope Guinga Sobati Quibanga. No. **114** pr. p. Ster.

Ad Serra Chella in Angola legit Newton teste Nyl., *l.c.*

12. **P. concrescens** Wain., sp. n.

Thallus superne glaucescenti-albidus, subtus niger, adpressus, crebre laciniatus, laciniis inæqualiter dilatatis, circ. 4 ad 0·5 mm. latis, planis, contiguis et passim confluentibus, apicibus subtruncatis, circ. 1 ad 0·5 mm. latis, irregulariter dichotome ramosis,

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esorediatus, medium versus crebre isidiosus, isidiis brevibus, crassitudine mediocribus, subtus rhizinis brevibus increbris instructus, medulla alba, KHO superne lutescens, intus non reagens, $CaCl_2O_2$ non reagens. Apothecia juvenilia sola parce visa, cupuliformia, sessilia, parva, disco rufo, nudo, margine integro aut fisso. Pycnoconidia sub-bifusiformia, long. 0·006 ad 0·005, crass. 0·0007 mm., recta. Thallo magis irregulariter laciniato a *P. consimili* Wain. differt.

HUILLA (3800 ad 5500 ped. s. m.).—Ad truncum in regione edita montis Serra da Xella. No. **30** pr. p.

13. **P. gracilescens** Wain., Etud. Lich. Brés. I. p. 53.

Var. **Angolensis** Wain.

Thallo minus nitido et laciniis magis confertis a *P. gracilescente* differt. Medulla thalli neque KHO nec $CaCl_2O_2$ reagens.

HUILLA (3800 ad 5500 ped. s. m.).—Ad truncos in regionibus editis montis Serra da Xella. No. **30** pr. p. Ad truncos in Morro de Lopollo. No. **31** pr. p. Fert.

14. **P. Majoris** Wain., Lich. Madagasc. p. 33.

HUILLA (3800 ad 5500 ped. s. m.).—Ad ramulos arborum in regionibus summis rupestribus montis Serra da Xella. No. **29**. Ster.

GOLUNGO ALTO.—Ad truncos *Meliæ* in Monte Cungulungulo. No. **118** (**91** pr. p.). Ster.

15. **P. coronata** Fée, Ess. Crypt. Écorc. p. 123; Wain., Etud. Lich. Brés. I. p. 59; Lojka, Lich. Univ. n. 159.

Var. **denudata** Wain.

Thallus neque isidiosus nec isidioideo-divisus.

HUILLA (3800 ad 5500 ped. s. m.).—Ad truncos Olacinearum (*Apodytis dimidiatæ* E. Mey.) in sylvis editis montis Morro de Lopollo. No. **33**. Fert.

16. **P. subconspersa** Nyl., Fl. 1869, p. 293.

Var. **Benguellensis** (Welw.) Wain.

Thallus subtus usque ad ambitum nigricans, rhizinis parce instructus, neque sorediis nec isidiis instructus, neque KHO, nec $CaCl_2O_2$ reagens.

HUILLA (3800 ad 5500 ped. s. m.).—Ad truncos arborum frondosarum sempervirentium in regione sylvatica montis Morro de Lopollo. No. **31** pr. maj. p. Fert. Ad truncos arborum in regionibus editis montis Serra da Xella. No. **30** pr. p. (parce immixta). Fert.

17. **P. conspersa** (Ehrh.) Sch.

HUILLA.—Ad saxa arenaria in regionibus editis (5600 ped. s. m.) montis Morro de Lopollo. Nos. **53** et **54** pr. p. Ster.

Medulla KHO lutescens et demum rubescens.

18. **P. Mougeotina** Nyl., Lich. Nov. Zel. (1888), p. 27; Hue, Nyl. Lich. Exot. p. 81.

P. Mougeotii Nyl., Lich. Angol. Welw. (1869), p. 4.

HUILLA.—Ad saxa arenaria in regionibus editis (5600 ped. s. m.) montis Morro de Lopollo. Nos. **53** et **54** pr. p. Ster.

Medulla KHO lutescens, KHO($CaCl_2O_2$) lutescens, neque rubescens. Ster.

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19. **P. prolixa** (Ach.) Nyl.

Var. **dendritica** (Pers.) Nyl., Lich. Scand. p. 192, Lich. Angol. Welw. p. 4.

MOSSAMEDES.—Ad saxa quartzitica in alta planitie inter Caroca et Cazimba in Cabo Negro. Nos. **48** et **49**. Ster.

Habitu inter *P. sorediatam* (Ach.) Th. Fr. et *P. stygiam* (L.) Ach. est intermedia, laciniis haud rugulosis, convexis, esorediatis a priore differens. Thallus conceptaculis pycnoconidiorum immersis crebre instructus, laciniis circ. 0·5 ad 0·3 mm. latis, fusco-nigricantibus, sat opacis, neque KHO, nec $CaCl_2O_2$ reagens. Stratum corticale superius cartilagineum, 0·018 ad 0·020 mm. crassum, cavitatibus cellularum 0·0015 mm. latis, sicut in *P. sorediata*. In *P. stygia* stratum corticale superius est circ. 0·050 mm. crassum.

TRIB. II.—LECANOREÆ.

1. **CANDELARIA** (Mass.) Wain.

1. **C. concolor** (Dicks.) Wain., Etud. Lich. Brés. I. p. 70.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos in sylvis prope Sange. No. **153** pr. p. Ster.

PUNGO ANDONGO (2400 ad 3800 ped. s. m.).—Ad Vellosias in rupibus prope Præsidium. No. **111** pr. p. Ster.

2. **HÆMATOMMA** Mass.

1. **H. puniceum** (Ach.) Wain.

Var. **esorediata** Wain., Etud. Lich. Brés. I. p. 72.

PUNGO ANDONGO (2400 ad 3800 ped. s. m.).—Ad truncum vetustum arboris e fam. Rosacearum in corona arboris 80 ad 90 ped. altit. in sylvis inter Luxillo et Præsidium. No. **140**.

GOLUNGO ALTO.—Ad *Ficum pseudoelasticam* prope Canguera Sange (1000 ad 2400 ped. s. m.). No. **143**. Ad corticem *Corynanthis paniculat.* in sylvis primitivis densis montis Serra de Alta Queta. No. **139**.

3. **LECANORA** (Ach.) Wain.

1. **L. vitellina** (Ehrh.) Ach.

HUILLA.—Ad saxa calcarea prope cataractam Terrao (? Ferrão da Sola) 6000 ped. s. m. teste Nyl., Lich. Angol. p. 6.

2. **L. subfusca** (L.) Ach.

Var. **subcrenulata** Nyl., Lich. Nov.-Gran. Addit. (1867), p. 310. Wain., Etud. Lich. Brés. i. p. 77.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos in sylvis prope Sange. No. **144**. Sporæ long. 0·014 ad 0·020, crass. 0·007 ad 0·008 mm. Ad truncos juniores in sylvis montis Serra de Alta Queta. No. **131**.

3. **L. æquinoctialis** Stizenb., Lich. Afr. p. 114.

Ramulicola prope Banana ad ostium fluminis Kongo lecta a P. Hesse: Stizenb., *l.c.*

4. **L. albella** Ach. ***L. angulosa** (Ach.) Wain.

GOLUNGO ALTO.—Corticola ad Cungulungulo. No. **427** pr. p.

Ad formam atypicam pertinet. Apothecia conferta, circ. 1 mm.

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lata, disco livido-testaceo, tenuiter pruinoso, margine crenulato aut integro, crassitudine mediocri. Sporæ long. 0·015 ad 0·010, crass. 0·006 ad 0·005 mm. Hymenium jodo persistenter cærulescens.

5. **L. cinereocarnea** (Eschw.) Wain., Etud. Lich. Brés. I. p. 80.

GOLUNGO ALTO (1000 ad 2400 ped. s.m.).—Ad truncos juniores arborum in sylvis prope Sange. No. **135***c*.

Var. **carneola** Wain.

Apothecia obscure subcarnea, tenuissime, sed distincte, pruinosa, margine tenuissimo, crenulato, persistente, disco convexiusculo.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos vigentes arborum in Alta Queta. No. **130.**

Var. **rufocarnea** Wain.

Habitu sicut *L. cinereocarnea*, sed disco apotheciorum epruinoso, carneo-rufescente. Apothecia lat. 0·4 mm., crebra, disco plano aut demum convexiusculo, sat opaco, margine tenuissimo, crenulato, persistente. Sporæ long. 0·012 ad 0·010, crass. 0·007 ad 0·006 mm. Sporis minoribus, disco minus nitido et margine tenuiore a *L. subfusca* var. *subcrenulata* Nyl. differt et margine multo tenuiore a var. *chlarotera* (Nyl.) discrepat.

GOLUNGO ALTO (1000 ad 2400 metr. s. m.)—Ad truncos vigentes Anacardiacearum (*Spondias*) in sylvis inter Sange et Trombeta. Nos. **129, 133, 348.**

6. **L. monodoræ** sp. n. Welw. in herb.

Thallus crustaceus, effusus, tenuis, verruculosus aut verruculoso-inæqualis, esorediatus, KHO lutescens, $CaCl_2O_2$ non reagens, hypothallo nigro. Apothecia crebra aut passim contigua, innata et diu subimmersa, demum subadpressa, parvula, 0·3 to 0·4 mm. lata, disco plano aut concaviusculo, pallido, $CaCl_2O_2$ non reagente, epruinoso, margine tenuissimo, subintegro, discum vulgo haud superante. Hymenium totum decoloratum, jodo persistenter cærulescens. Hypothecium decoloratum. Sporæ 8næ, distichæ, simplices, decolores, oblongæ aut subellipsoideæ, long. 0·011 ad 0·013, crass. 0·005 mm. Affinis est *L. cinereocarneæ*, at apotheciis minoribus, diutius immersis, crebrioribus, epruinosis ab ea differens, et forsan ejus subspecies.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos *Monodoræ Myristichæ* in sylvis primævis editis montis Cungulungulo. No. **138.**

7. **L. melanocardia** (Tuck.) Wain., Etud. Lich. Brés. I. p. 86.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos vetustiores arborum Combretacearum in sylvis primævis juxta ripas fluminis Luinha. No. **137.**

8. **L. atra** (Huds.) Ach.

F. **Americana** Müll. Arg., Rev. Lich. Fée (1887), p. 8. Wain., *l.c.*, p. 93.

HUILLA.—Rarior ad truncos *Parinarii* in editis montis Morro de Lopollo (3800 ad 5500 ped. s. m.). No. **38.**

9. **L. prosecha** Ach., Lich. Univ. (1810), p. 346; Wain., Lich. Antill. p. 5.

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Var. **homaloplaca** (Nyl.) Wain.

Lecanora homaloplaca Nyl., Lich. Angol. p. 7.

PUNGO ANDONGO.—Ad rupes et lapides in monte Præsidii. No. **61** pr. p.

Thallus glaucescenti-albidus aut stramineo-glaucescens, KHO lutescens et demum fulvescens, esorediatus. Apothecia fusca aut locis umbrosis etiam rubescentia. In var. *rubescentem* Wain., Lich. Antill. p. 5, transit.

4. **MARONEA** Mass.

1. **M. horizoides** (Müll. Arg.) Wain.

Lecanora horizoides Müll. Arg., Lich. Parag. (1888), p. 10.

HUILLA (3800 ad 5500 ped. s. m.).—Ad truncos *Parinarii* in sylvis editis montis Morro de Lopollo. No. **40** pr. p.

Thallus fuscescens, verrucosus et verruculosus, esorediatus. Discus fuscus, sat opacus. Asci polyspori. Sporæ long. 0·006, crass. 0·002 mm., oblongæ, simplices.

TRIB. III.—PERTUSARIEÆ.

1. **PERTUSARIA** DC.

1. **P. tropica** Wain., sp. n.

Habitu subsimilis est *P. commutatæ* Müll. Arg. et *P. multipunctæ* (Turn.), at pseudostromatibus esorediatis. Thallus sat tenuis, continuus, leviter verruculoso-inæqualis, glaucescenti-cinerascens aut glaucescenti-albidus, neque KHO nec $CaCl_2O_2$ reagens. Pseudostromata 0·5 ad 1, raro 1·2 mm. lata, elevata, basi haud constricta aut demum distincte constricta, apothecium unum continentia. Discus apotheciorum apertus dilatatusque, crebre albo-pruinosus, KHO violascens, $CaCl_2O_2$ non reagens. Asci membrana tota incrassata. Sporæ solitariæ, long. 0·115 ad 0·150, crass. 0·025 ad 0·045 mm., membrana circ. 0·010 ad 0·015 mm. crassa, stratis æqualibus, lævibus.

HUILLA (3800 ad 5500 ped. s. m.).—Ad corticem *Tarchonanthi* in summo monte Serra de Xella ante Mumpulla. No. **7** (parce).

PUNGO ANDONGO (2400 ad 3800 ped. s. m.).—Ad corticem arboris Rosaceæ. No. **429**.

2. **P. variolosa** (Krempelh.) Wain., Etud. Lich. Brés. I. (1890), p. 106.

Var. **simplex** Wain.

Pseudostromata apothecia subsolitaria continentia. Discus apotheciorum KHO intense lutescens, $CaCl_2O_2$ non reagens. Thallus et pseudostromata neque KHO nec $CaCl_2O_2$ reagentia.

GOLUNGO ALTO.—Corticola ad Cungulungulo. No. **427** pr. p. Ad truncos vigentes *Zanthoxyli* in silvis primævis montis Serra de Alta Queta prope Sange. No. **435**.

AMBACA.—Ad corticem arboris. No. **431**.

P. conglobata (Ach.) Nyl. (*P. velata* Turn.; Hue, Pert. p. 12) in Loango a Pechuel-Loesche lecta est, ut indicat Müll. Arg., Lich. Afr. Occ. p. 34.

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3. **P. microthelia** Wain., sp. n.

Thallus crassitudine mediocris (circ. 0·5 mm.), diffracto-areolatus rimosusve, crebre verruculoso-rugulosus, flavido- vel stramineo-glaucescens, KHO intense lutescens, $CaCl_2O_2$ non reagens. Medulla jodo levissime cærulescens. Apothecia circ. 0·5 mm. lata, thallo immersa aut parum elevata, sorediosa, albida. Sporæ haud evolutæ.

HUILLA (3800 ad 5500 ped. s. m.).—Ad rupes prope cataractam de Lopollo. No. **5**. Ad rupes juxta cataractam prope Fazenda do Ferrão. No. **47**.

4. **P. congesta** Wain., sp. n.

Thallus sat tenuis, leviter inæqualis, sordide albidus, neque KHO, nec $CaCl_2O_2$ reagens. Pseudostromata thallo concoloria, circ. 0·8 ad 2 mm. lata, depresso-subglobosa, basi demum constricta, apice convexo, leviter verrucoso-inæqualia, ostiolis nigris, punctiformibus, pseudostroma æquantibus, conferta et partim contigua, KHO neque extus nec intus reagentia, vulgo apothecia plura continentia. Sporæ 2næ ad 8næ, sæpius 4næ, long. 0·042 ad 0·075, crass. 0·020 ad 0·025 mm., membrana circ. 0·004 mm. crassa, stratis æqualibus, lævigatis. A *P. tuberculifera* Nyl. sporis haud striatis et pseudostromatis verrucosis confertis et magis irregularibus differt.

GOLUNGO ALTO.—Ad truncos Leguminosarum in sylvis. No. **425**.

5. **P. limbata** Wain., Etud. Lich. Brés. I. p. 110.

AMBRIZ.—Ad corticem Spondiaceæ Ncumbi (i.e. *Calesiam antiscorbutica* Hiern, Welw. No. 4450). No. **426**.

Sporæ 8næ, monostichæ, long. 0·060 ad 0·080, crass. 0·030 ad 0·035 mm., intus luteæ aut albidæ, membrana 0·006 mm. crassa, stratis æqualibus, lævigatis.

6. **P. glaucocinerea** Wain., sp. n.

Thallus crassitudine mediocris, crebre verruculoso-rugulosus, glauco-cinereus, KHO intus fulvescens, extus non reagens. Pseudostromata thallo concoloria, circ. 0·8 ad 1·5 mm. lata, depresso-subglobosa, basi demum constricta, apice convexo aut rarius levissime impresso, leviter verrucoso-inæqualia, ostiolis nigricantibus, pseudostroma æquantibus aut leviter prominulis, punctiformibus, crebra, KHO intus fulvescentia, extus haud reagentia, apothecia 1 ad 5 continentia. Sporæ 8næ, distichæ, long. 0·050 ad 0·100, crass. 0·020 ad 0·028 mm., membrana intus striata aut in eodem apothecio etiam stratis lævigatis, exosporio sat tenui, haud mucoso.

GOLUNGO ALTO.—Ad ramulos arboris Artocarpearum in sylvis primævis montis Serra de Alta Queta. No. **434**.

7. **P. crebra** Wain., sp. n.

Thallus sat tenuis, leviter inæqualis, albidus vel glaucescenti-albidus, rimosus, KHO non reagens. Pseudostromata 0·5 ad 0·8 mm. lata, depresso-subglobosa, basi constricta, apice vulgo convexo et cinereo-pallido, ostiolis cinereis vel obscuris, punctiformibus, leviter prominentibus, conferta, KHO intus fulvescentia,

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apothecia 1 ad 4 continentia. Sporæ 8næ, monostichæ aut distichæ, long. 0·020 ad 0·030, crass. 0·010 ad 0·016 mm., membrana sat tenui, haud mucosa, stratis lævigatis.

GOLUNGO ALTO.—Ad truncos vigentes in sylvis primævis montis Serra de Alta Queta. No. **436**.

8. **P. Angolensis** Wain., sp. n.

Thallus tenuissimus aut evanescens, albidus. Pseudostromata hemisphærica aut conoidea, 0·3 ad 0·5 mm. lata, ochracea aut albida, KHO intense lutescentia, apice convexo, ostiolo punctiformi, nigricante pseudostroma subæquante, apothecium unum continentia aut raro duo confluentia. Sporæ binæ aut 4næ aut 8næ, monostichæ, long. 0·065 ad 0·090, crass. 0·018 ad 0·030 mm., membrana circ. 0·004 mm. crassa, haud mucosa, stratis sat æqualibus lævigatis.

Var. **ochracea** Wain. Pseudostromata ochracea. Sporæ binæ.

GOLUNGO ALTO.—Ad truncos *Grewiæ* locis arboribus rare obsitis in montibus Serra de Alta Queta. No. **442** pr. p.

Var. **albella** Wain. Pseudostromata albida. Sporæ 4næ—8næ. In eodem specimine cum var. *ochracea*.

9. **P. cryptocarpoides** Wain., Etud. Lich. Brés. I. p. 112.

GOLUNGO ALTO.—Ad ramulos arboris "dizanha" (i.e. *Treculia africana*) in sylva juxta basin montis Serra de Alta Queta. No. **183**. Fert.

Sporæ long. circ. 0·042 ad 0·050, crass. 0·018 ad 0·020 mm., 8næ ad 4næ, monostichæ aut distichæ, stratis membranæ lævigatis.

10. **P. arthonioides** Wain., sp. nov.

Thallus sat tenuis aut mediocris, rugosus, pallido-albidus, KHO neque extus, nec intus reagens. Pseudostromata indistincta aut demum leviter elevata, irregularia, apothecia vulgo plura (1 ad 7) continentia. Ostiolum arthoniomorphum, dilatatum, rotundatum aut ellipsoideum, latitudine circ. 0·2 ad 0·4 mm., pallidum, pseudostroma æquans. Asci cylindrici. Sporæ 8næ, imbricato-monostichæ, aut distichæ, stratis æqualibus, lævigatis, haud gelatinosis, long. 0·060 ad 0·066, crass. 0·025 ad 0·028 mm.

GOLUNGO ALTO.—Ad truncum arboris (Mutala-Menha Cafele, i.e. *Millettia nudiflora* Welw. No. 1850) in sylvis. No. **174** pr. p.

TRIB. IV.—THELOSCHISTEÆ.

1. **THELOSCHISTES** (Norm.) Th. Fr.

1. **Th. flavicans** (Sw.) Müll. Arg.

F. **glabra** Wain., Etud. Lich. Brés. I. p. 114.

GOLUNGO ALTO.—Frequenter ad ramulos emortuos arborum in omnibus declivibus sylvaticis montis Serra de Alta Queta. Nos. **82** et **83** pr. p.

Thallus sorediosus. Raro fert.

F. **cinerascens** Stein.; Müll. Arg., Lich. Afr. Trop. (1890), p. 338.

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Thallus glaucescens aut passim parce fulvo-glaucescens, glaber, striis albis passim instructus. Apothecia haud fibrillosa.

GOLUNGO ALTO.—Ad ramulos arborum in editis (2800 met. s.m.) montis Cungulungulo. No. **83** pr. p. Fert.

2. **Th. scorigena** (Mont.) Wain.

Evernia Mont., Syll. p. 318. *Lecanora* Nyl., Lich. Angol. p. 5.

Thallus maxima parte ex hyphis irregulariter contextis conglutinatis formatus, cavitate cellularum angusta elongata, membrana modice incrassata, chondroideus, cavitatibus laxioribus gonidia (Cystococcum) continentibus passim instructus.

MOSSAMEDES.—Frequenter ad rupes conchiferas (calcareas) prope Pedras de D. Soão II^do. (? Don João segundo) in Cabo Negro. No. **22**. Fert.

2. **PLACODIUM** (DC.) Tul.

1. **Pl. elegans** (Link) Ach.

MOSSAMEDES.—Ad lapides dispersas calcareas in summo jugo (500 ad 600 ped. s. m.) montis Serra de Montes Negros. Nos. **43**, **483**. Ster. (parcissime fructifera teste Welw.).

2. **Pl. elegantissimum** (Nyl.) Wain.

Lecanora elegantissima Nyl., Lich. Angol. p. 5.

MOSSAMEDES.—Ad saxa quartzosa in montibus arenaceis, arena volatili lectis inter Caroca et Cazimba (4 ad 6 mil. dist. ab Oceano) prope Cabo Negro. Nos. **45**, **48** pr. p., **49** pr. p.

3. **Pl. flavorubens** Nyl., Lich. Angol. p. 5.

Lecanora Nyl. in Cromb. Lich. Chall. p. 212.

INS. CAPITIS VIRIDIS.—Ad rupes vulcanicas in Monte Verde 300 ped. s. m. in insula S. Vincenti. No. **162**. Fert.

4. **Pl. cinnabarinum** (Ach.) Anzi.

MOSSAMEDES.—Frequenter ad rupes schistosas verticales inter Maiombo et Cazimba. No. **14**.

HUILLA (3800 ad 5500 ped. s. m.).—Ad rupes juxta cataractas Ferrão da Sola. Nos. **484** pr. p., **46** pr. p. Ad saxa arenaria in editis montis Morro de Lopollo. Nos. **53**, **54** pr. p., **11***b* pr. p.

PUNGO ANDONGO (2400 ad 3800 ped. s. m.).—Ad rupes et lapides in summis jugis montium ad Cume da Pedra Cazella. No. **62** pr. p. Frequentissime ad rupes in editis ipsius Præsidii. Nos. **481** pr. p., **60** pr. p., **61** pr. p., **161** (**480** pr. p., **482**).

Var. **pallidior** (Müll. Arg.).

Ad Pungo Andongo a Soyaux lecta est teste Müll. Arg., Lich. Beitr. n. 333.

5. **Pl. ferrugineum** (Huds.) Hepp.

Var. **pyrithromoides** Wain.

Lecanora pyracea f. *pyrithroma* Nyl., Lich. Angol. p. 6.

Thallus albus, sat tenuis. Apothecia minuta (circ. 0·2 ad 0·3 mm.), aurantiaca, margine tenuissimo concolore demum excluso, diu thallo semi-immersa.

MOSSAMEDES.—In summo jugo (500 ped. s.m.) in Montes Negros.

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No. **51** pr. p. Ad rupem schistosam perpendicularem inter Maiombo et Cazimba una cum v. *Benguellensi* (Nyl.). No. **17** pr. p.

Affinis est v. *lamprocheilæ* (DC.) Wain. (= v. *festivæ* Ach.).

Var. **Benguellensis** (Nyl.) Wain.

Lecanora Benguellensis Nyl., Lich. Angol. p. 6.

MOSSAMEDES.—Ad rupes schistosas perpendiculares inter Maiombo et Pomangala in Serra de Cazimba. Nos. **485** pr. p., **17** pr. p.

Margine apotheciorum nigricante differt a var. *lamprocheila* (DC.) Wain. (v. *festiva* Ach.), quæ interdum item observatur margine partim nigricante. Thallus est obsoletus. Discus ferrugineus.

6. **Pl. polioterum** (Nyl.) Wain.

Lecanora poliotera Nyl. in Fl. 1869 p. 70. *Blastenia* Müll. Arg., Lich. Afr. Occid. (Linnæa 1880), p. 36.

Ad lapides prope Pungo Andongo leg. Soyaux teste Müll. Arg., *l.c.* Variatio sit *Pl. ferruginei*, proxime affinis var. *Benguellensi* (Nyl.).

7. **Pl. Brebissonii** (Fée) Wain.

Lecidea Fée, Ess. Crypt. Ecorc. Suppl. (1837), p. 108. *Blastenia* Müll. Arg., Lich. Beitr. n. 1034.

Var. **microspora** Wain.

Apothecia margine demum cinereo, primum ferrugineo et disco concolore. Sporæ long. 0·020 ad 0·024, crass. 0·012 ad 0·013 mm., 2-septatæ.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad ramulos in coronis *Sponiæ* (i.e. *Celtis Soyauxii* ; Welw. No. 6298) in sylva juxta ripas rivi Cuango prope Sange. No. **156**.

Sporis cum *Pl. croceo* (Kremp., Fl. 1876, p. 317) congruit.

TRIB. V.—BUELLIEÆ.

1. **ANAPTYCHIA** Koerb.

1. **A. leucomelæna** (L.) Wain., Etud. Lich. Brés. I. p. 128.

Var. **vulgaris** Wain., *l.c.*

GOLUNGO ALTO.—Ad ramos arboris Euphorbiaceæ in Mata Quisucula. No. **99** pr. p. Fert. Ad ramos arboris in Alta Queta. No. **99***b*.

Var. **multifida** (Mey. et Flot.) Wain., *l.c.*

PUNGO ANDONGO (2400 ad 3800 ped. s. m.).—Frequenter ad rupes gneissaceas Præsidii. No. **100**.

GOLUNGO ALTO.—Frequenter in arboribus ad Cungulungulu. No. **102**. Etiam fert.

INS. CAPITIS VIRIDIS.—In montosis editioribus Ins. Jacobi frequenter. No. **101**.

F. **squarrosa** Wain.

Thallus laciniis angustis (sicut in v. *multifida*), fibrillis nigricantibus, squarroso-ramosis.

HUILLA (3800 ad 5500 ped. s. m.).—Ad ramos arborum in summo jugo montis Serra da Xella (ubi hæc species frequenter obvenit). No. **34**. Fert.

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2. **A. palpebrata** (Tayl.) Wain.

Physcia leucomela v. *subcomosa* Nyl., Syn. Lich. p. 414 (Müll. Arg., Lich. Beitr. n. 1349).

Habitu similis *A. galactophyllæ* (Tuck.) et *A. podocarpæ* (Bél.), at fibrillis subsimplicibus parce in parte superiore thalli (secund. coll. Mandon n. 1766 bis, 1859, in mus. Paris.).

GOLUNGO ALTO.—Ad ramulos arboris Euphorbiaceæ in Matta de Quisuculo. No. **99** pr. p. Ster.

3. **A. hypoleuca** (Mühlenb.) Wain. * **A. dentritica** (Pers.) Wain., Etud. Lich. Brés. i. p. 134.

GOLUNGO ALTO.—Ad ramos muscosos arborum in sylvis editis primitivis montis Cungulungulo. No. **98**. Ster.

4. **A. speciosa** (Wulf.) Wain.

Var. **esorediata** Wain. Thallus laciniis esorediatis, margine subintegris.

HUILLA (3800 ad 5500 ped. s. m.).—Ad truncos in sylvis editioribus in Morro de Lopollo. Nos. **35** pr. p., **39**. Etiam fert.

GOLUNGO ALTO.—Ad truncos Leguminosarum prope Trombeta. No. **106**. Fert.

Var. **lobulifera** Wain.

Thallus laciniis margine demum minute crenulatis, esorediatis.

HUILLA (3800 ad 5500 ped. s. m.).—Ad truncos *Parinarii* in sylvis editioribus in monte Morro de Lopollo. No. **35** pr. p. Fert.

5. **A. isidiophora** (Nyl.) Wain.

Similis *A. speciosæ*, at thallus margine isidiosus, isidiis brevibus, subcylindricis. Thallus superne et inferne strato corticali obductus, rhizinis pallidis subsimplicibus inferne instructus, esorediatus, KHO superne et intus lutescens. Apothecia margine demum isidioso, haud distincte laciniato. Thallo fere solum margine isidioso et reactione thalli a *A. granulifera* (Ach.) differt. *Ph. Domingensis f. isidiophora* Nyl. (Hue, Lich. Exot. p. 110) huc pertinet.

PUNGO ANDONGO (2400 ad 3800 ped. s. m.).—Ad rupes perpendiculares juxta rivulos ad Barranco da Pedra Songue frequenter, at raro fructificans. No. **96**.

6. **A. granulifera** (Ach.) Wain.

Parmelia granulifera Ach., Syn. Lich. (1814), p. 212 (secund. herb. Ach.).

Thallus superne albidus aut glaucescenti-albidus, subtus albidus aut pallidus et rhizinis pallidis aut obscuratis increbris subsimplicibus sat brevibus instructus, superne et inferne strato corticali obductus, laciniis adpressis, irregularibus, planis aut concaviusculis, in margine et superficie granulis isidioideis vulgo subglobosis instructus, KHO superne lutescens, intus primum lutescens et demum rubescens (etiam in specimine orig in herb. Ach.), ambitum versus superne tenuissime pruinosus (f. *pruinosa* Wain).

GOLUNGO ALTO.—Ad basin truncorum putrescentium in Serra de

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Alta Queta. No. **104**. Supra *Frullaniam squarrosam* ad radices Orchidearum parasiticarum *Camoensiæ* florigeræ in Mata de Quibanga. Nos. **97**, **75**. Ster.

2. **PHYSCIA** (Schreb.) Wain.

1. **Ph. integrata** Nyl.

Var. **sorediosa** Wain., Etud. Lich. Brés. I. p. 142.

GOLUNGO ALTO.—Ad truncos vigentes Artocarpearum cet. in sylvis prope Sange. Nos. **119**, **93** pr. p. Ster.

2. **Ph. cæsia** (Hoffm.) Nyl.

Ad lapides prope Pungo Andongo leg. Soyaux teste Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 33 ("var. *teretiuscula* Nyl.").

3. **Ph. triseptata** Wain., sp. n.

Thallus superne glaucescenti-albidus, opacus, KHO superne et intus intense lutescens, irregulariter crebre laciniatus, laciniis adpressis, planiusculis, inæqualiter dilatatis cuneatisque, circ. 1 ad 4 mm. latis, contiguis, subtus pallidus, rhizinis brevibus, vulgo sat crebris, simplicibus, pallidis instructus, esorediatus, isidiis destitutus. Apothecia circ. 2 ad 1 mm. lata, disco fusco-nigro aut fusco, nudo aut tenuissime pruinoso, plano, margine sat tenui aut mediocri, integro, discum leviter aut parum superante. Excipulum efibrillosum. Hypothecium albidum. Sporæ 8næ, distichæ, fuscescentes, primum 1-septatæ, demum 3-septatæ, septis poro instructis, long. 0·022 ad 0·026, crass. 0·008 ad 0·010 mm. Habitu valde similis est *Ph. integratæ* var. *obsessæ*, at sporis 3-septatis et thallo inferne pallido ab ea differens.

GOLUNGO ALTO.—Ad corticem *Spond.* tuberosæ prope Sange. No. **93** pr. p.

4. **Ph. obscura** (Ehrh.) Th. Fr.

Var. **cycloselis** (Ach.) Wain.

GOLUNGO ALTO.—Ad ramos fruticum in sylvis non densis ad latera montium in Alta Queta. No **105**. Ster.

5. **Ph. syncolla** Tuck.; Wain., Etud. Lich. Brés. I. p. 148.

PUNGO ANDONGO (2400 ad 3800 ped. s.m.).—Ad ramulos Vellosiarum in editis rupibus Præsidii. No. **107**. Fert.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad ramos arborum in sylvis prope Sange. No. **132**. Fert. Ad corticem arboris Zanthoxyleæ ad Zengas do Queta. No. **94** pr. p. Fert.

6. **Ph. (Dirinaria) picta** (Sw.) Wain., Etud. Lich. Brés. I. p. 150.

GOLUNGO ALTO.—Ad truncos arborum in sylvis junioribus prope Sange. No. **121***a*. Fert. Thallus sorediosus.

Var. *rupicola* Bagl. teste Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 33, supra saxa granitica ad ostium flum. Banya ad Mayumbe a Pechuel-Loesche lecta est.

7. **Ph. palmarum** Wain. sp. n.

Thallus cinereo-glaucescens aut albidus, subtus obscuratus, KHO superne lutescens, intus non reagens, irregulariter crebre

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laciniatus, laciniis adpressis, ad ambitum planis, confluentibus, circ. 0·5 ad 0·7 mm. latis, valde tenuibus, esorediatus isidiis destitutus, rhizinis nullis distinctis. Apothecia disco plano, nigro, nudo, margine subintegro aut crenulato, discum æquante, circ. 2 ad 1 mm. lata. Hypothecium fuscofuligineum. Epithecium fuscescens. Sporæ 8næ, distichæ, long. 0·013 ad 0·018, crass. 0·005 ad 0·008 mm., 1-septatæ, septo sat tenui, membrana ad apices crassiore. A *Ph. ægialita* (Ach.) Nyl. (Wain., Lich. Bras. Exs. n. 148) thallo multo tenuiore, laciniis angustioribus et sporis minoribus facile distinguitur.

F. **sophodes** Wain.

Thallus demum centrum versus verrucoso-inæqualis, cinereo-glaucescens.

INS. PRINCIPIS.—Ad cortices palmarum (*Elæis guineensis*) aliarumque arborum prope Pico de Papagaio non infrequens. No. **95** pr. p. Fert.

AMBRIZ.—In n. **123***a* adest planta omnino similis, at KHO non reagens. Ad truncos arborum in sylvis claris inter Ambriz et Mussulo lecta. Forsan est species autonoma, at nimis parce visa. Nominetur **Ph. (Dir.) areolata** Wain.

F. **undulata** Wain.

Thallus laciniis longitudinaliter undulatis rugosisve, albidis.

INS. PRINCIPIS.—Ad cort. (*Elæis guineensis*) prope Pico de Papagaio. No. **95** pr. p. Fert.

8. **Ph. Africana** Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 33.

Ph. picta **Ph. Africana* Stizenb., Lich. Afr. p. 80.

Thallo plumbeo-cinereo v. fuscescenti-plumbeo et rigidiore a *Ph. palmarum* differt et saxicola est.

Ad lapides prope Pungo Andongo. Fert.—*Ph. picta* f. *isidiophora* Nyl., Fl. 1867, p. 3, teste Müll. Arg., *l.c.*, cum v. *rupicola* Bagl. a Pechuel-Loesche lecta est. Species autonoma sit, nam in *Ph. picta* thallus numquam est isidiosus, at a me non est visa.

9. **Ph. erythrocardia** (Tuck.) Wain.

Pyxine picta **erythrocardia* Tuck., Syn. North. Am. Lich. (1882), p. 79. *Physcia picta* var. *coccinea* Müll. Arg., Lich. Beitr. (1885), n. 937.

Thallus esorediatus, demum verrucoso-rugosus, subtus nigricans, rhizinis indistinctis, medulla partim miniato-rubescente, partim alba, laciniis ad ambitum tenuibus, planis, circ. 0·5 ad 1 mm. latis, adpressis, bene confluentibus, superne cinerascens aut flavido-glaucescens, KHO superne haud reagens, intus partibus albis haud reagentibus, partibus rubris violascentibus. Apothecia 1·5 ad 1 mm. lata, disco nigro, nudo, planiusculo, margine subintegro, discum leviter aut parum superante, materiam rubescentem continente. Hypothecium fusco-nigrum. Sporæ 8næ, distichæ, long. 0·012 ad 0·022, crass. 0·006 ad 0·008 mm., 1-septatæ, septis crassis, poro instructis, apice membrana bene incrassata.

LOANDA.—Ad ramulos fruticis *Balsamodendri* prope Maianga do Povo rara. No. **103** pr. p. Fert. Ad ostium fluminis Kongo lecta a P. Hesse, teste Stizenb., Lich. Afr. p. 80.

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10. **Ph. reticulata** Wain. sp. n.

Thallus livido-albicans aut cinereo-pallescens, minute albido-reticulatus et ambitum versus leviter pruinosus, KHO superne flavescens, intus non reagens, irregulariter laciniatus, laciniis adpressis, planis, contiguis et leviter confluentibus, circ. 2 mm. latis, centrum versus soraliis rotundatis, elevatis, minute sorediosis instructus, subtus obscuratus, rhizinis brevibus simplicibus obscuratis instructus. Apothecia incognita. Habitu similis est *Ph. ægialitæ* var. *hypotrachynæ* Wain. (Lich. Bras. Exs. n. 163), thallo rhizinis instructo cum ea congruens, at sorediis ab ea differens.

AMBRIZ.—Ad truncos arborum in sylvis claris inter Ambriz et Mussulo. No. **123***b*.

3. **PYXINE** Fr.

1. **P. Meissneri** Tuck., Obs. Lich. i. (1860), p. 400; Wain., Etud. Lich. Brés. I. p. 153.

Var. **subobscurascens** Malme, Pyxin. p. 37.

Thallus esorediatus, medulla passim materiam ochraceo-fulvescentem KHO dilute purpurascentem continens. Excipulum materiam ochraceo-fulvescentem continens. Sporæ long. 0·015 ad 0·019, crass. 0·005 ad 0·007 millim. Hypothecium KHO non reagens. Epithecium olivaceum aut smaragdulum, KHO violascens. Stratum corticale excipuli fuscescens, KHO violascens.

HUILLA.—Ad truncos vigentes *Apodytis dimidiatæ* E. Mey. in sylvis editis prope Lopollo (3800 ad 5500 ped. s. m.). No. **8** pr. p. Fert.

2. **P. chrysantha** Wain.

Thallus sat tenuis, superne cinereo-glaucescens, epruinosus, soraliis minutis albidis aut fulvis instructus, medulla fulva, KHO neque superne nec intus reagens, laciniis circ. 0·5 (passim etiam 1) mm. latis, irregularibus subcuneatisque, continuis contiguisque, radiantibus, planis, lævigatis, subtus nigricantibus. Apothecia parce visa (0·7 mm. lata), margine nigricante, haud diu thallode instructa, disco nigro nudo. Excipulum intus subalbidum, extus in margine fuligineum et KHO violascens, inferne dilute smaragdulum, KHO non reagens. Hypothecium fuscescens, KHO non reagens. Epithecium olivaceo-smaragdulum, KHO solutionem violaceam effundens. Sporæ fuscescentes, membrana inæqualiter incrassata, in apicibus crassiore, vulgo 1-septatæ, pr. p. 2-septatæ, raro 3-septatæ, long. 0·014 ad 0·020, crass. 0·005 ad 0·007 mm. Affinis est *Pyxini Meissneri* Tuck. Huc verisimiliter pertinet *P. cocoës* v. *chrysantha* Müll. Arg., Lich. Afr. Trop. (1890), p. 341, tantum sterilis descripta.

GOLUNGO ALTO.—Ad corticem arboris in sylvis primævis prope Sange. No. **178** pr. p.

3. **P. endoleuca** (Müll. Arg.) Wain., Lich. Ruwenz. p. 10.

P. Meissneri v. *endoleuca* Müll. Arg., Lich. Beitr. (1879), n. 118.

GOLUNGO ALTO.—Ad truncos vigentes in sylvis primævis prope Sange. No. **120**. Fert.

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4. **RINODINA** Mass.

1. **R. Huillensis** Wain., sp. n.

Lecanora sophodes Nyl., Lich. Angol., p. 6 (haud Ach.).

Thallus crustaceus, rimoso-areolatus, areolis 0·3 ad 0·4 mm. latis, angulosis, contiguis, planis, lævigatis, badio- aut olivaceo-fuscescentibus, opacis, sat tenuibus, hypothallo nigricante, KHO non reagens. Apothecia thallo immersa, 0·2 ad 0·3 mm. lata, disco fusco-nigricante, nudo, plano, margine thallode tenui, thallo concolore, integro, parum distincto. Hymenium jodo persistenter cærulescens. Hypothecium albidum. Epithecium fuscescens. Paraphyses laxe cohærentes. Sporæ 8næ, distichæ, long. 0·013 ad 0·016, crass. 0·006 ad 0·008 mm., haud constrictæ, apice membrana crassiore, 1-septatæ, septa sat crassa, poro lato. Habitu similis est *R. Budensi* (Nyl.), qui sporis longioribus et apotheciis demum elevatis ab ea differt. *R. milvina* (Wahlenb.) thallo verruculoso et membrana sporarum æqualiter incrassata ab ea distinguitur. *R. sophodes* (Ach.) ei parum est affinis.

HUILLA (3800 ad 5500 ped. s.m.).—Ad rupes juxta cataractam Ferrão prope Lopollo. Nos. **50**, **46** pr. p.

5. **BUELLIA** De Not.

1. **B. disciformis** (Fr.) Br. et Rostr.; Wain., Etud. Lich. Brés. I., p. 165.

Var. **minor** Fr. f. **rugulosa** (Ach.) Wain., Adj. Lich. Lapp. II. p. 112.

GOLUNGO ALTO.—Ad ramulos *Fici trachyphyllæ* (Mucoso) in ambulacris prope Sange. No. **163**. Ad ramos Artocarpearum in sylvis primævis (No. **180**), et ad ramos Grewiarum in sylvis increbris (No. **207**), in Serra de Alta Queta. Ad truncos vetustos *Meliæ* (No. **182**), et ad truncos juniores (No. **175**), in sylvis primævis ad Cungulungulo.

Var. **rhodina** Wain. Thallus crassitudine mediocris, verrucoso- et verruculoso-inæqualis, medulla passim rosea, materiam rubram parce continens. Sporæ 1-septatæ, long. 0·014 ad 0·018, crass. 0·006 ad 0·008 mm.

GOLUNGO ALTO.—Ad truncos arboris Mangue do monte dictæ (i.e. *Corynanthe paniculata*) in Alta Queta. No. **176**.

2. ***B. rosellotincta** (Nyl.) Wain.

Lecidea disciformis var. *rosellotincta* Nyl., Syn. Lich. Nov. Caled. p. 52.

Thallus verrucosus et verruculosus, extus et intus rubescens. Sporæ 1-septatæ, long. 0·016 ad 0·020, crass. 0·005 ad 0·007 mm.

GOLUNGO ALTO.—Ad truncos vigentes arborum in sylvis primævis prope Sange. No. **178**.

3. ***B. subdisciformis** (Leight.) Wain., Etud. Lich. Brés. I. p. 167.

HUILLA (3800 ad 5500 ped. s. m.).—Ad truncos *Apodytis dimidiatæ* E. Mey. in sylvis editioribus prope Lopollo. Nos. **9**, **10**.

4. ***B. lauricassiæ** (Fée) Wain.

Lecidea lauricassiæ Fée, Ess. Crypt. Ecorc. Suppl. (1837), p. 48.

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Buellia lauricassiæ Müll. Arg., Rev. Lich. Fée (1887), p. 4. *Lecidea triphragmia* Nyl., Prodr. Lich. Gall. (1857), p. 141.

Thallus KHO lutescens. Sporæ 3-septatæ, long. circ. 0·018, crass. 0·006 mm.

GOLUNGO ALTO.—Ad truncos in sylvis primævis prope Sange. No. **179**.

5. **B. subalbula** (Nyl.) Müll. Arg., Lich. Ægypt. (1880), p. 18 (excl. var.). *Lecidea* Nyl., Lich. Angol. p. 11.

MOSSAMEDES.—Ad lapides calcareas dispersas in summo jugo (500 ad 600 ped. s.m.) in Serra de Montes Negros. Nos. **2** pr. p., **12**, **15** pr. p., **51** pr. p. Ad rupes calcareas in alta planitie inter Caroca et Cazimba. No. **52**.

Medulla jodo non reagens. No. **15**. Pertinet ad f. *miniato-reagentem* Wain. Hujus hypothecium KHO solutionem luteam, demum crystalla rubra formantem, effundens.

6. **B. anatolodia** Mass., Lich. Cap. p. 35; Müll. Arg., Lich. Afr. Occ. p. 36.

Ad saxa granitica prope Mayumba ad ostium flum. Banya leg. Pechuel-Loesche teste Müll. Arg., *l.c.*—*Dimelæna Stanleyi* Stein, Afr. Flecht. (1888), p. 8, supra lapides quartzosos prope Vivi ad flumen Kongo a Ledien lecta est.

7. **B. punctiformis** (Hoffm.) Mass.

Patellaria myriocarpa DC., Fl. Fr. 3, ed. II. (1805), p. 346.

F. **stigmatea** (Koerb.) Wain.

Buellia stigmatea Koerb., Syst. Lich. Germ. p. 226.

INS. CAPITIS VIRIDIS.—Ad rupes vulcanicas in ins. St. Vincent circ. 300 ped. s.m. No. **66**.

8. **B. rinodinea** Mass., Lich. Cap. (1861), p. 31.

Lecidea ocellata Floerk. f. *purior* Nyl., Lich. Angol. (1869), p. 11. Haud *Buellia verruculosa* (Borr.) Th. Fr., Lich. Scand. p. 600 (*L. ocellata* Floerk., *L. Kaleida* Tayl., Müll. Arg., Lich. Beitr. n. 1426).

Thallo $CaCl_2O_2$ non reagente et hypothecio pallido a *B. verruculosa* (Borr.) Th. Fr. differt. Ad species inter *Buellias* et *Rinodinas* intermedias pertinet, perithecio laterali nigricante passim evoluto, passim deficiente, in basi apothecii perithecio semper deficiente.

HUILLA.—Ad saxa arenaria in summo monte Morro de Lopollo (5600 ped. s. m.). Nos. **53** pr. p., **54** pr. p.

PUNGO ANDONGO (2400 ad 3800 ped. s. m.).—Ad lapides gneissaceas in summo monte Pedra de Cazella. Nos. **64** pr. p., **480** pr. p.

9. **B. stellulata** (Tayl.) Br. et Rostr.; Wain., Etud. Lich. Brés. I. p. 174.

HUILLA (3800 ad 5500 ped. s.m.)—Ad saxa arenaria prope cataractam Ferrão da Sola. No. **484** pr. p., **11** pr. p. Ad rupes arenarias in Morro de Lopollo. No. **11***b* pr. p.

PUNGO ANDONGO.—Ad saxa arenaria in summis jugis Præsidii (2400 ad 3800 ped. s. m.). No. **60** pr. p.

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F. **subtilis** Wain.

Thallus albidus, KHO leviter flavescens, areolis 0·1 ad 0·2 mm. latis. Apothecia 0·1 ad 0·2 mm. lata. Hypothecium fusco-fuligineum. Sporæ long. 0·009 ad 0·008, crass. 0·005 mm. Hypothallus nigricans ad ambitum distinctus. Apotheciis et areolis thalli minoribus a typo differt, et a *B. punctiformi* f. *stigmatea* fere solum reactione distinguitur.

PUNGO ANDONGO.—Ad rupes et lapides in summo monte Pedra de Cazella. No. **64** pr. p.

10. **B. depressa** Wain., sp. n.

Thallus crustaceus, uniformis, sat tenuis, areolatus, cinereus, KHO non reagens, areolis 0·1 ad 0·25 mm. latis, angulosis, planis, contiguis, fissuris nigro-limitatis, medulla jodo non reagente, hypothallo nigricante. Apothecia 0·2 ad 0·15 mm. lata, thallo immersa, humida fusca, sicca nigra, nuda, opaca, plana, immarginata aut margine tenuissimo nigricante. Hypothecium albidum. Excipulum proprium basi albidum, latere fusco-fuligineum tenue aut partim indistinctum. Epithecium fuscescens, KHO non reagens. Sporæ 8næ, distichæ, fuscæ, 1-septatæ, long. 0·008 ad 0·011, crass. 0·006 ad 0·007 mm.

PUNGO ANDONGO.—Ad lapides quartzosos in monte Præsidii. No. **61** pr. p. Ad rupes et lapides gneissaceas in summo monte Pedra de Cazella (2400 ad 3800 ped. s. m.). Nos. **64** pr. p., **480** pr. p., **481** pr. p.

Ad species inter *Buellias* et *Rinodinas* intermedias pertinet. Habitu fere similis est *Lecanoræ* (*Aspiciliæ*) *gibbosæ*, sed minor.

11. **B. recepta** (Krempelh.) Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 36. *Lecidea* Krempelh., Fl. 1876, p. 318.

Ad lapides prope Pungo Andongo leg. Soyaux teste Müll. Arg., *l.c.*

12. **B. Afra** (Stizenb.).

Lecidea Afra Stizenb., Lich. Afr. II. p. 175. *Buellia Africana* Müll. Arg., Lich. Beitr. (1879), n. 123, haud *Lecidea* (*Buellia*) *Africana* Tuck. in Proceed. Am. Acad. of Arts and Sciences, 1860, p. 406.

Ad lapides prope Pungo Andongo leg. Soyaux teste Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 36.

13. **B. spuria** (Schær.) Arn., Fl. 1872, p. 291; Th. Fr., Lich. Scand. p. 605; Wain., Etud. Lich. Brés. I. p. 177.

Var. **ferruginea** Wain.

Thallus ochraceo-pallidus aut partim etiam albidus, hydrate kalico solutionem luteam effundens, areolatus aut rimosus, lævigatus, hypothallo nigricante interdum inter areolas conspicuo, medulla jodo bene cærulescente. Apothecia thallo immersa aut areolis immixta, thallum subæquantia aut demum leviter superantia, vulgo planiuscula, margine tenui aut evanescente. Hypothecium fuscum. Epithecium fuscescens. Hymenium jodo persistenter cærulescens. Sporæ 8næ, distichæ, long. 0·010 ad 0·012, crass. 0·006 ad 0·007 mm.

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HUILLA.—Ad saxa arenaria in summo monte Morro de Lopollo (5600 ped. s. m.). Nos. **53** pr. p., **54** pr. p.

Abrothallus episemoides (Nyl.) Wain.

Lecidea episemoides Nyl., Lich. Angol. p. 10.

LOANDA.—Parasita supra *Tremotylium Angolense*. No. **164** pr. p. Ad fungos pertinet.

TRIB. VI.—STICTEÆ.

1. PSEUDOCYPHELLARIA Wain.

1. **Ps. aurata** (Ach.) Wain., Etud. Lich. Brés. I. p. 183.

Sticta aurata Ach., Meth. Lich. p. 277.

GOLUNGO ALTO.—Ad corticem arboris in Serra de Alta Queta parce cum specie sequente lecta. No. **91** pr. minore parte. Ster. Thallus sorediosus.

2. **Ps. clathrata** (De Not.) Wain.

GOLUNGO ALTO.—Ad corticem in corona arboris in Serra de Alta Queta. Rarissime. No. **91** pr. p. Fert. Sorediis destituta.

TRIB. VII.—HEPPIEÆ.

1. HEPPIA Naeg.

1. **H. congregata** Nyl. in Hue Lich. Exot. p. 125. *Endocarpiscum congregatum* Nyl., Lich. Angol. p. 14.

Thallus foliaceo-squamosus, squamis 3 ad 15 mm. longis, demum sæpe dichotome repetito-laciniatus, laciniis 1 ad 3 mm. latis, superne vulgo convexis, inferne concavis (apicibus sæpe planiusculis, rotundatis), prostratis aut adscendentibus, esorediatis, confertis, basin versus rhizinis paucis instructus, solidus, membranaceo-compressus. Apothecia incognita. Pycnoconidia ovoideo-oblonga, long. 0·003, crass. 0·001 mm., altero apice acuto, altero obtuso rotundatove. Sterigmata neque ramosa, nec septata. Ad sect. *Pannariellam* pertinet.

PUNGO ANDONGO (2400 ad 3800 ped. s.m.).—Ad rupes gneissaceas in summo monte Præsidii versus Caghuy. No. **242**. Ad rupes arenarias prope cataractam Cachoeira de Condo fluminis Cuanza. Nos. **243**, **243***b*. Etiam in n. **59** adest.

2. **H. Schweinfurtii** (Müll. Arg.).

Endocarpiscum Schweinfurtii Müll. Arg., Lich. Beitr. (1879), n. 124.

Ad saxa prope Pungo Andongo leg. Soyaux teste Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 40. Observante Müll. Arg. non differt a *Heterina tortuosa* Krempelh., Fl. 1876, p. 57 (coll. Glaziou n. 5115).

3. **H. Mossamedana** Wain., sp. n.

Thallus areolatus vel subsquamosus, areolis rotundatis aut difformibus, circ. 1 ad 0·3 mm. latis, subintegris, dispersis, planiusculis aut convexis, olivaceo-fuscescentibus, adpressis, medio

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late substrato affixis, gompho nullo distincto, rhizinis nullis. Apothecia vulgo solitaria in quavis squamula, thallo immersa, disco 0·2 ad 0·5 mm. lato, rufo, fuscescente aut pallescente, margine thallino discum et squamam leviter superante, neque distincte a thallo differente et in eam sensim continuato, instructa. Epithecium luteum. Hymenium jodo intense persistenter cærulescens. Paraphyses sat arcte cohærentes. Asci ventricosi, polyspori. Sporæ globosæ aut ellipsoideæ, long. 0·003 ad 0·004, crass. 0·003 mm.

MOSSAMEDES (0 ad 1000 ped. s.m.).—Ad lapides calcareas in summo jugo in Serra de Montes Negros. No. **483** pr. p.

Ad sect. *Solorinariam* pertinet. Thallus homœomericus, in lamina tenui superne aureus.

TRIB. VIII.—COLLEMEÆ.

1. **LEPTOGIUM** (Ach.) Gray.

1. **L. cæsium** (Ach.) Wain., Etud. Lich. Brés. I. p. 225.

L. tremelloides f. *isidiosa* Müll. Arg., Lich. Beitr. n. 374.

GOLUNGO ALTO.—Supra muscos ad corticem arboris ad Mata de Quisucula. No. **79***b*. Ster.

2. **L. phyllocarpum** (Pers.) Nyl.; Wain., *l.c.*, p. 230.

GOLUNGO ALTO.—Ad corticem *Adansoniæ* prope Sange. No. **75***b*. Sporæ murales.

3. **L. adpressum** Nyl., Syn. Lich. p. 131.

HUILLA.—Ad truncos vivos *Parinarii* in sylvis editis montis Morro de Lopollo 5000 ad 5600 ped. s. m. No. **1**.

Sporæ long. 0·060 ad 0·086, crass. 0·005 ad 0·007 mm., 7—10-septatæ, fusiformes, apicibus attenuatis acutisque. Thallus adpressus, sat crassus, crebre acute rugulosus et verruculosus.

PUNGO ANDONGO (2400 ad 3800 ped. s. m.).—Ad *Vellosiam* in rupibus editioribus Præsidii. No. **78**.

Sporæ 7—8-septatæ, apicibus attenuatis acutisque. Paraphyses increbre septatæ. Thallus adpressus, crassus, inæqualis, superficie creberrime verrucosa et acute rugulosa.

2. **COLLEMA** (Hill) Fr.

1. **C. vespertilio** (Lightf.) Wain., Etud. Lich. Brés. I. p. 235.

GOLUNGO ALTO.—Ad corticem arborum in editis (2300 ped. s. m.) supra Bança de Quilombo. No. **74**. Ad truncos vetustos *Adansoniæ* prope Pereira. No. **76**. Ad truncos vetustos juxta oras sylvæ primitivæ ad Quisucula. No. **77**. Ad *Swieteniam* in Quibolo. No. **77***b*. Ad ramos emortuos in sylvis in Serra de Alto Queta. No. **80**.

No. 76 ad f. *subpruinosam* Wain., disco apotheciorum tenuissime pruinoso instructam, pertinet.

3. **OMPHALARIA** (Gir.) Mont.

1. **O.** (sect. **Peccania**) **minuscula** (Nyl.) Wain.

Synalissa minuscula Nyl., Lich. Angol. p. 3.

Thallus superne fruticuloso-divisus, inferne peltatus, pulvinulos circ. 1 ad 1·5 mm. latos et 0·5 mm. crassos formans, gonidia

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xanthocapsoidea, membrana olivaceo-aurea gelatinosa incrassata instructa continens, ramis circ. 0·070 ad 0·140 mm. crassis, apice obtusis aut rotundatis clavatisve.

MOSSAMEDES.—Ad saxa calcarea in summo monte Serra de Montes Negros 500 ad 600 ped. s. m. No. **2** pr. p., **15** pr. p.

4. **PSOROTICHIA** Mass.

1. **Ps. fuliginella** (Nyl.) Wain.

Collema fuliginellum Nyl., Lich. Angol. p. 4.

Thallus gonidia olivaceo-aurea *Xanthocapsæ* continens.

MOSSAMEDES. — Ad rupes micaceo-schistosas prope Pomangula. Nos. **57, 58.**

2. **Ps. Gorgonina** Wain., sp. n.

Thallus tenuissimus, granulosus, dispersus, fuligineus. Apothecia facie pyrenodea, in verruculis circ. 0·2 mm. latis, elevatis, solitariis inclusa, disco punctiformi impresso. Hymenium totum decoloratum aut epithecio pallido, jodo levissime aut parum cærulescens, dein lutescens. Paraphyses parce evolutæ, haud constrictæ. Asci cylindrici aut clavati. Sporæ 8næ, monostichæ aut distichæ, simplices, globosæ, diam. 0·007 ad 0·008 mm. Gonidia xanthocapsoidea.

INS. CAPITIS VIRIDIS.—Ad rupes vulcanicas in Monte Verde in insula S. Vicenti 300 ped. s. m. No. **162.**

TRIBE IX.—LECIDEÆ.

1. **CLADONIA** (Hill) Web.

1. **Cl. fimbriata** (L.) Fr.

Var. **chondroidea** Wain. f. **Balfourii** (Cromb.) Wain., Mon. Clad. Univ. ii. p. 339.

Cl. fimbriata var. *tenella* Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 31.

Ad radices et basin arborum secus Banya in regione Loango leg. Pechuel-Loesche.

2. **LECIDEA** (Ach.) Wain.

1. **L. (Bacidia) heteroloma** Wain., sp. n.

Thallus crustaceus, subcontinuus aut rimosus, sat tenuis, verruculoso-inæqualis, glaucescenti-albidus, KHO non reagens, hypothallo sæpe ad ambitum linea nigricante indicato, ex hyphis crebre contextis formato. Apothecia 0·6 ad 0·9, rarius 1·2 mm. lata, disco persistenter plano aut demum convexo, fusco-nigricante aut fusco, nudo, opaco, margine sat crasso aut mediocri, persistente, pallido aut cinerascente. Excipulum pallidum, hyphis radiantibus, pachydermaticis, cellulis elongatis, cavitate cellularum angusta. Hypothecium pallidum. Hymenium totum decoloratum (n. 149) aut epithecio cerasino-rufescente (n. 125, 148) aut parte inferiore rufescente (n. 150), jodo persistenter cærulescens. Paraphyses arcte cohærentes, filiformes. Sporæ 8næ, aciculares

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(n. 125, 148, 149) et apice inferiore attenuatæ aut bacillares (n. 150) et apicibus obtusis, circ. 5—9-septatæ, long. circ. 0·036 ad 0·056 (in n. 150: 0·017 ad 0·028) mm., crass. 0·002 ad 0·035 mm. Habitu similis est *L. Sitianæ* Wain., Lich. Bras. Exs. n. 813, et *L. ochrocheilæ* Wain., *l.c.*, n. 860, at sporis tenuioribus a priore et hypothecio pallido a posteriore differens. *L. heterochroa* (Müll. Arg., Lich. Beitr. n. 203) thallo obscuriore et apotheciis pallidioribus ab ea distinguitur.

Var. **elongata** Wain.

Apothecia margine cinerascente aut cinereo-pallescente. Sporæ aciculares, apice inferiore attenuato, long. 0·036 ad 0·056, crass. 0·002 ad 0·003 mm.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad corticem arborum (*Cordiæ*) in sylvis primævis densioribus prope Sange. Nos. **125**, **148**, **149** pr. p.

Var. **bacteriospora** Wain.

Apothecia margine pallido. Hymenium circ. 0·055 ad 0·060 mm. crassum, majore parte inferiore rufescens, epithecio decolorato. Sporæ bacillares, apicibus obtusis aut aciculares et altero apice attenuato, pluriseptatæ, long. 0·017 ad 0·028, crass. 0·003 ad 0·035 mm.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos juniores in sylvis primævis in Serra de Alta Queta. No. **150**.

2. **L. byssothallina** Wain. sp. n.

Thallus verruculosus aut verruculoso-inæqualis, glaucescenti-albidus, KHO flavescens, hypothallo bene evoluto, byssoideo, ex hyphis laxe contextis formato, albido aut (præsertim ad ambitum) fuscescente. Apothecia 0·8 ad 1 mm. lata, disco demum convexo, livido-nigricante aut fusco-nigricante, nudo, opaco, margine mediocri, persistente, livido-pallescente. Excipulum pallidum aut rufescens aut solum extus rufescens, ex hyphis radiantibus, modice pachydermaticis formatum, cellulis oblongis, sat angustis, KHO non reagens. Hypothecium rufescens, KHO non reagens. Hymenium circ. 0·100 ad 0·070 mm. crassum, jodo cærulescens, dein obscure vinose rubens. Epithecium fuscescens, KHO non reagens. Paraphyses arcte cohærentes, 0·0015 mm. crassæ, apicibus leviter aut parum incrassatis. Sporæ 8næ, aciculares, apice inferiore attenuato, altero apice obtuso, circ. 7- ad 8-septatæ, long. 0·042 ad 0·058, crass. 0·0035 ad 0·004 mm.

GOLUNGO ALTO.—Ad truncos arborum in sylvis primævis humilioribus summi jugi montis Cungulungolo. No. **177**.

3. **L. Golungensis** Wain., sp. n.

Thallus crustaceus, subcontinuus, tenuis aut sat tenuis, verruculoso-inæqualis, sæpe parce etiam granulosus, glaucescens, KHO non reagens, hypothallo indistincto aut ad ambitum linea fuscescente indicato, ex hyphis crebre contextis formato. Apothecia 0·5 ad 1 mm. lata, disco demum vulgo convexo, rufo aut testaceo-rufescente, nudo, opaco, margine tenui, disco concolore obscurioreve,

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rufescente aut fuscescente, demum vulgo excluso. Excipulum pallidum aut in margine intus rufescens, hyphis radiantibus, cellulis angustis, oblongis. Hypothecium pallidum. Epithecium decoloratum. Hymenium jodo persistenter cærulescens. Sporæ 8næ, rectæ, bacillares aut aciculares, 3—6-septatae, long. 0·026 ad 0·042, crass. 0·002 ad 0·003 mm. Paraphyses tenues, filiformes, simplices aut raro parce connexæ, sat arcte cohærentes.

Var. **pluriseptata** Wain.

Sporæ apicibus obtusis aut apice inferiore attenuato, circ. 4- ad 6-septatæ, long. 0·038 ad 0·042 mm. Hymenium circ. 0·060 ad 0·070 mm. crassum.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos vigentes *Cordiæ* in sylvis primævis densioribus prope Sange. No. **149** pr. p. Ad truncos vigentes in sylvis in Serra de Alta Queta. No. **154**.

Var. **pauciseptata** Wain.

Sporæ apice inferiore attenuato, 3-septatæ, long. 0·026 to 0·036, crass. 0·0025 to 0·003 mm. Hymenium circ. 0·055 to 0·065 mm. crassum.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos arborum juniorum in sylvis prope Sange. Nos. **135***a*, **136**. Ad truncos arborum in sylvis primævis in Serra de Alta Queta. Nos. **150***c*, **151**.

4. **L. laurocerasi** (Del.) Wain.

Patellaria laurocerasi Del. in Dub. Bot. Gall. p. 653. *Lecidea endoleuca* Nyl. in Hue, Lich. Exot. p. 201; Malme, Bot. Not. 1895, p. 209.

Var. **amylothelia** Wain.

Hymenium jodo persistenter cærulescens. Apothecia atra, margine concolore aut primo sæpe cinereo-nigricante. Epithecium cerasino-fuscescens, KHO purpurascens. Paraphyses paulum connexae, apice clavatæ, in KHO sat laxæ. Hypothecium pallidum. Excipulum pallidum, in margine cerasino-fuscescens. Sporæ long. 0·046 ad 0·054, crass. 0·002 ad 0·003 mm.

GOLUNGO ALTO.—Ad truncos juniores in sylvis prope Sange. No. **184**.

5. **L. medialis** Tuck. in Wright, Lich. Cub. n. 203; Wain., Etud. Lich. Brés. II. p. 17.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos arborum juniorum in sylvis prope Sange. No. **134**.

6. **L. (Bilimbia) farinulenta** (Müll. Arg.).

Patellaria farinulenta Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 36.

In foliis coriaceis in planitie depressa secus flum. Quilla leg. Pechuel-Loesche teste Müll. Arg., *l.c.*

7. **L. sublecanorina** (Nyl.) Wain.

Platygrapha sublecanorina Nyl., Lich. Angl. p. 13.

Thallus flavido-glaucescens vel stramineo-glaucescens, gonidiis cytococcoideis instructus. Apothecia 0·2 ad 0·3 mm. lata, orbicularia, disco fusconigro, plano, opaco, nudo, margine tenui, integro,

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albido, gonidiis destituto. Hypothecium fuscescens aut fusco-rufescens. Excipulum subtus et in parte marginali interiore fuscescens, ex hyphis conglutinatis formatum, in parte marginali exteriore glaucescens aut albidum, ex hyphis irregulariter crebre contextis conglutinatis aut subconglutinatis tenuibus formatum, inferne clausum, strato thallino gonidiifero impositum. Hymenium jodo persistenter cærulescens. Epithecium tenuiter fuscescens. Paraphyses increbre ramoso-connexæ, apice crebrius ramosæ connexæque. Sporæ oblongo- vel ovoideo-fusiformes, apicibus obtusis, long. vulgo 0·015, crass. 0·004 mm. Conceptacula pycnoconidiorum pallida. Sterigmata brevia, pauci-articulata, ramosa. Pycnoconidia lageniformia vel pyriformi-oblonga, long. 0·005 ad 0·008, crass. 0·015 mm., apice angustiore sterigmatibus affixa.

GOLUNGO ALTO.—Ad folia *Eugeniæ uniflorœ* (Pitangueira) cultæ prope Sange. No. **308**. Ad folia arboris sempervirentis in sylvis primævis in Sobato Bango-Aquitamba. No. **315**. Ad folia Sapindacearum prope Capopa. No. **304** pr. p.

8. **L. exiguella** Wain., sp. n.

Affinis et subsimilis est *L. sublecanorinæ*, a qua colore thalli et thallo tenuiore, apotheciis minoribus, tenuioribus, margine cinerascente tenuioreque distinguitur. Thallus tenuissimus, continuus, viridis, opacus, gonidiis globosis, simplicibus, cystococcoideis, diam. circ. 0·010 ad 0·006 mm. Apothecia, 0·15 ad 0·20 mm. lata, orbicularia aut demum angulosa, disco fusconigro, plano, opaco, nudo, margine tenui, integro, cinerascente aut sordide albicante, gonidiis destituto. Hypothecium rufescens. Excipulum testaceo-rufescens, ex hyphis irregulariter crebre contextis, subconglutinatis, tenuibus formatum, strato obscurato rufescenteve gonidia parce continenti thalli impositum. Hymenium circ. 0·060 mm. crassum, jodo persistenter cærulescens. Epithecium testaceo-rufescens. Asci clavati aut pyriformes, long. circ. 0·040, crass. 0·012 ad 0·018 mm., apice membrana leviter incrassata. Paraphyses sat parce evolutæ, leviter ramoso-connexæ. Sporæ 8næ, polystichæ, decolores, oblongæ aut ovoideo-oblongæ, rectæ aut rarius leviter curvatæ, 3-septatæ, haud constrictæ, long. 0·011 ad 0·014, crass. 0·003 ad 0·004 mm., apicibus obtusis aut rotundatis. Conceptacula pycnoconidiorum testacea. Sterigmata brevia (0·004 ad 0·003 mm.), subsimplicia, apicibus pycnoconidia efferentibus. Pycnoconidia pyriformi-oblonga, long. 0·003 ad 0·004, crass. 0·0015 mm., recta, apice angustiore sterigmatibus affixa.

GOLUNGO ALTO.—Ad folia *Fici urceolaris* Welw. (cf. No. 6336) in silva primitiva ad Quisuculo una cum *Strigula atrocarpa*, *Str. hypothelia*, *Str. Africana* et *Asterothyrio Welwitschii*. No. **288** pr. p.

Habitu *Rinodinam exiguam* in memoriam revocat.

9. **L. (Lopadium) olivaceum** (Müll. Arg.) Wain.

Lopadium olivaceum Müll. Arg., Lich. Beitr. (Flora 1881), n. 271, Lich. Epiphyll. (1890), p. 15.

Thallus tenuissimus, lævigatus, glaucescens, gonidiis cystococ-

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coideis instructus. Apothecia 0·4 ad 0·35 mm. lata, fuscescentia aut testaceo-fuscescentia, planiuscula, margine tenuissimo concolore. Excipulum pallidum, pseudoparenchymaticum, cellulis minutissimis, inferne anguste cyanescens. Hypothecium pallidum, inferne testaceum, KHO non reagens. Hymenium totum decoloratum, jodo persistenter cærulescens. Paraphyses parcissime ramoso-connexæ, maxima parte simplices. Sporæ solitariæ, demum pallidæ, murales, cellulis numerosissimis, halone nullo, long. 0·060 ad 0·073, crass. 0·020 ad 0·024 mm. Colore hypothecii et basis excipuli paulum a *L. olivacea* (Müll. Arg.) differt, quare nuncupetur var. **alsodinea** Wain.

GOLUNGO ALTO.—Ad folia perennia Alsodinearum in sylvis editioribus densis in Alta Queta. No. **311**.

10. **L. (Bombyliospora) Domingensis** (Pers.) Nyl.

GOLUNGO ALTO.—Ad corticem arboris Artocarpeæ in sylvis primævis in Alta Queta. Nos. **167, 168**.

11. **L. (Psora) placodina** Nyl., Lich. Angol. p. 9.

Affinis est *L.* (*Psoræ*) *conglomeratæ* (Koerb.), neque ad stirpem *L. parasemæ* pertinet (ut censet Nylander).

MOSSAMEDES.—Ad lapides quartzosos in alta planitie inter Caroca et Cazimba cum *Welwitschia mirabili*. No. **49**.

12. **L. (Biatora) russula** Ach.

HUILLA (3800 ad 5500 ped. s. m.).—Ad truncos *Parinarii* et ad ramulos fruticum in sylvis editis in Morro de Lopollo. Nos. **37, 39, 40**.

13. **L. cinereorubra** Wain., sp. n.

Thallus crustaceus, sat tenuis, subcontinuus, verruculoso-inæqualis, esorediatus, cinereo-glaucescens aut sordide albicans, KHO flavescens, hypothallo indistincto. Apothecia 0·4 ad 0·8 mm. lata, adpressa, sordide vel obscure coccinea, nuda, jam primitus immarginata convexaque. Hypothecium pallido-rubescens vel fulvo-rubescens, KHO non reagens. Hymenium dilute fulvescens, jodo persistenter cærulescens. Epithecium rubescens, KHO violascens. Paraphyses arcte cohærentes. Asci clavati. Sporæ 8næ, distichæ, ellipsoideæ vel oblongæ, apicibus obtusis, long. 0·008 ad 0·009, crass. 0·004 mm., simplices, decolores. Affinis est *L. cinnabarinæ* Sommerf., a qua thallo esorediato obscurioreque, apotheciis paullo obscurioribus et hypothecio fulvescente differt. Etiam *L. cinnabarodes* Nyl., *L. griseococcinea* Nyl. et *L. russulina* Müll. Arg. (Lich. Beitr. n. 431) ab ea differunt.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos juniores in sylvis editis in Serra de Alta Queta. No. **150*b***.

14. **L. subsimilis** Nyl., Prodr. Fl. Nov.-Gran. ed. 2 (1863), p. 347 (Lich. Nov. Zel. p. 81). *L. tenuis* Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 34 (Lich. Beitr., 1882, n. 507).

Ad ramos in planitie secus flumen Quillu legit Pechuel-Loesche teste Müll., *l.c.*

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15. **L. gyalectoides** Wain., sp. n.

Thallus crustaceus, tenuis aut mediocris, subcontinuus, verruculoso-inæqualis, esorediatus, cinereo-glaucescens, KHO non reagens, hypothallo indistincto. Apothecia 1 ad 0·5 mm. lata, adpressa, disco persistenter plano aut demum depresso-convexo, pallido aut rarius testaceo, nudo, margine concolore aut pallidiore, tenui, persistente aut demum subexcluso. Excipulum pallidum aut passim testaceum. Hypothecium pallidum. Hymenium jodo persistenter cærulescens. Epithecium aut hymenium totum pallidum. Paraphyses arcte cohærentes, 0·0015 mm. crassæ, simplices, apice haud incrassatæ. Asci clavati. Sporæ 8næ, distichæ, oblongæ, apicibus obtusis, simplices, decolores, long. 0·009 ad 0·014 (ad 0·017), crass. 0·004 ad 0·005 mm. Habitu subsimilis est *Gyalectæ luteæ*. Affinis est *L. vernali*, a qua apotheciis tenuioribus et reactione hymenii differt. *L. cinereo-lutescens* Nyl. apotheciis minoribus et sporis crassioribus recedit. Affines etiam sunt *L. subpineti* Krempelh., *L. carneoalbens* Nyl., *L. subsimilis* Nyl., *L. pallens* Müll. Arg. (Lich. Beitr. n. 1505) et *L. Puiggarii* Müll. Arg. (Lich. Beitr. n. 346, haud Nyl., Lich. Fueg. p. 34).

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos vigentes in sylvis inter Sange et Camilungo. No. **126**. Ad truncos vigentes in sylvis primævis densioribus in Serra de Alta Queta. No. **146**. Ad truncos vetustos *Cordiæ* in sylvis primævis prope Bango-Aquitamba. No. **152**.

16. **L. Capopensis** Wain., sp. n.

Thallus crustaceus, sat tenuis, sat continuus aut rimosus, superficie verruculoso-inæquali et leviter granulosa, cinereo-glaucescens, KHO non reagens, hypothallo albido, parum distincto. Apothecia 0·7 ad 1 mm. lata, adpressa, disco persistenter planiusculo aut demum convexo, testaceo, nudo aut subnudo, margine tenui, vulgo fuscescente, vulgo persistente. Excipulum pallidum aut partim in margine extus anguste rufescens, cellulis minutis. Hypothecium albidum. Hymenium totum decoloratum aut epithecio pallido, jodo persistenter cærulescens. Paraphyses arcte cohærentes. Sporæ 8næ, monostichæ aut distichæ, simplices, decolores, ellipsoideæ, long. 0·008 ad 0·012, crass. 0·005 ad 0·007 mm. Habitu subsimilis *L. luridescenti* Nyl. et *L. piperis* (Spreng.) est, at colore hypothecii ab iis differens. *L. testaceoglauca* Wain., Etud. Lich. Brés. II. p. 52, ei magis est affinis, at margine et sporis ab ea recedit.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos vigentes in sylvis editioribus in Capopa agri Sangensis. No. **127**.

17. **L. nigricans** Wain., sp. n.

Thallus crustaceus, sat tenuis, subcontinuus aut rimosus, superficie verruculoso-inæquali et leviter granulosa, glaucescens aut albido-cinerascens, KHO non reagens, hypothallo albido aut nigricante tenui limitatus. Apothecia 0·7 ad 1 mm. lata, adpressa, disco persistenter planiusculo aut demum depresso-convexo, nigri-

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cante, nudo, opaco, margine tenui, disco concolore, persistente. Excipulum dilute pallidum, in margine extus violaceo-rufescens. Hypothecium pallidum. Hymenium jodo persistenter cærulescens. Epithecium violaceo-rufescens. Paraphyses arcte cohærentes, tenues, haud connexæ. Asci clavati. Sporæ 8næ, distichæ, simplices, decolores, ellipsoideæ, long. 0·009 ad 0·013, crass. 0·006 ad 0·007 mm. Affinis præcedenti.

GOLUNGO ALTO.—Ad truncos arboris Artocarpeæ in sylvis primitivis prope Sange. No. **172***b*.

18. **L. canorubella** Wain., Etud. Lich. Brés. ii. p. 51.

Hypothecium fusco-fuligineum. Excipulum extus pallidum. Apothecia sordide fusco-testacea, margine fere concolore. Sporæ long. 0·009 ad 0·012, crass. 0·005 ad 0·008 mm.

GOLUNGO ALTO.—Ad corticem arboris Artocarpeæ in sylvis prope Sange. No. **171**.

19. **L. caliginosa** Stirt. *L. fuscorubescens* Nyl., Lich. Andam. (1874), p. 10; Cromb., Lich. Chall. p. 216, haud Nyl., Lich. Port-Nat. (1868), p. 8.

Var. **rhacocarpa** Wain. Apothecia aggregato-prolifera aut ambitu lobata aut pro minore parte simplicia, 0·5 ad 1·2 mm. lata, disco testaceo, plano aut convexiusculo, margine tenui, nigricante, persistente. Hypothecium fuscofuligineum, excipulum extus pallidum. Hymenium totum decoloratum, jodo persistenter cærulescens. Paraphyses arcte cohærentes, in KHO sat laxæ, haud connexæ. Sporæ 8næ, distichæ, simplices, decolores, long. 0·009 ad 0·012, crass. 0·006 ad 0·008 mm. Thallus sat tenuis aut mediocris, rimulosus, superficie leviter inæquali, parcissime granulosa, glaucescens, hypothallo crebre contexto nigricante angusto passim limitatus.

GOLUNGO ALTO.—Ad truncos *Diospyri* in Serra de Alta Queta, No. **170**.

20. **L. granifera** Ach., Syn. Lich. (1814), p. 163 (secund. herb. Ach.). *L. aurigera* Fée, Ess. Crypt. Ecorc. (1824), p. 106, Wain., Etud. Lich. Brés. II. p. 54.

Var. **lecanoroides** Wain. Verrucæ thalli intus stramineo-albidæ. Apothecia disco nigricante aut fusco, margine albido aut cinereo-albicante, integro.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos vigentes in sylvis primævis in Serra de Alta Queta (No. **145**), et inter Sange et Trombeta (No. **155**).

Var. **leucotropoides** Wain. Verrucæ thalli intus stramineo-albidæ. Apothecia disco testaceo, margine albido aut cinerascente aut circa hymenium nigro, subintegro.

SIERRA LEONE.—Ad truncos arborum (*Spondias*) prope Freetown. No. **166**.

21. **L. Mossamedana** Wain., sp. n.

Thallus crustaceus, sat tenuis aut mediocris, verruculis circ. 0·2 mm. latis aut parcius etiam verrucis areolisve irregularibus

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dispersis aut rarius subcontiguis, hypothallo albido et ad ambitum anguste cæruleo-nigricante, neque KHO nec $CaCl_2O_2$ reagens. Apothecia 0·7 ad 1·6 mm. lata, adpressa, convexa, disco nigricante, tenuissime pruinoso, margine tenuissimo nigro aut pruinoso demum evanescente. Excipulum nigricans, KHO non reagens. Hypothecium pallidum aut dilute fuscescens. Hymenium superius cærulescens, epithecio fuligineo, KHO non reagente, jodo cærulescens, demum obscuratum aut ascis partim obscure vinose rubentibus, materiam oleosam abundanter continens. Paraphyses arcte cohærentes, mediocres, haud connexæ. Asci clavati. Sporæ 8næ, distichæ, decolores, simplices, subglobosæ vel ellipsoideo-globosæ, long. 0·008 ad 0·009, crass. 0·007 ad 0·0065 mm. Pycnoconidia ellipsoidea, long. 0·003, crass. 0·0015 mm. Sterigmata pauciarticulata, brevia, apicibus abrupte attenuatis. Inter *Biatoras* et *Eulecideas* est intermedia.

MOSSAMEDES.—Ad lapides calcareas in Serra de Montes Negros 500 ad 600 ped. s. m. Nos. **13**, **15** pr. p.

22. **L. Sangeana** Wain., sp. n.

Thallus crustaceus, tenuis, verruculoso-inæqualis, esorediatus, albidus, KHO non reagens, hypothallo indistincto aut passim ad ambitum linea nigricante indicatus. Apothecia 0·5 ad 0·4 mm. lata, adpressa, disco atro aut fusco-atro aut pr. p. livido, nudo, plano aut planiusculo, margine tenui, atro, persistente, subintegro aut flexuoso. Excipulum et hypothecium fusco-fuligineum, KHO non reagens. Hymenium circ. 0·045 mm. crassum, jodo persistenter cærulescens. Epithecium dilute fuscescens aut rarius decoloratum, KHO non reagens. Paraphyses arcte cohærentes, haud ramosæ, tenues, apice clavatæ. Asci clavati. Sporæ 8næ, distichæ, decolores, simplices, fusiformes aut ellipsoideæ, long. 0·007 ad 0·015, crass. 0·003 ad 0·005 mm. *L. myriocarpoidem* Nyl. in memoriam revocat. Inter *Biatoras* et *Eulecideas* est intermedia.

GOLUNGO ALTO.—Ad arbores juniores Artocarpeas in sylvis prope Sange. Nos. **172**, **173**.

23. **L. (Eulecidea) lithagoga** (Nyl.) Wain.

Lecanora lithagoga Nyl., Lich. Angol. p. 7.

Thallus crassus (circ. 0·5 ad 0·7 mm.), areolas circ. 2 ad 1 mm. latas, ambitu crenulatas vel lobulatas, convexas aut rarius in crustam continuam confluentes formans, strato corticali cartilagineo verrucas convexas aut planiusculas aut rarius isidioideo-elevatas semipellucidas cimento thallino gonidia continente albido conglutinatas formante instructus, KHO levissime flavescens. Medulla jodo non reagens. Apothecia thallo immersa, excipulo fusco-fuligineo basi deficiente. Hypothecium pallidum, Hymenium superius dilute fuscescens, KHO sordide violascens. Paraphyses haud connexæ. Ad species inter *Eulecideas* et *Aspicilias* intermedias pertinet et affinis est *L. buelliancæ* Müll. Arg.

MOSSAMEDES.—Ad lapides calcareas in Serra de Montes Negros 500 ped. s. m. Nos. **16**, **51** pr. p.

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24. **L. Angolensis** Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 35, Lich. Yatab. Jap. (Nuov. Giorn. Bot. Ital. 1892), p. 197; Steiner, Flecht. Brit.-Ostafr. (1897), p. 223.

Ad lapides prope Pungo Andongo in Angola lecta a Soyaux teste Müll., *l.c.*

25. **L. leptobola** Nyl., Lich. Angol. p. 10.

HUILLA.—Ad lapides arenarios in Serra de Lopolo teste Nyl., *l.c.*

TRIB. X.—ACAROSPOREÆ.

1. **ACAROSPORA** (Mass.) Wain.

1. **A. tersa** (Fr.) Steiner, Flecht. Brit.-Ostafr. (1897), p. 219.

Parmelia chlorophana f. *tersa* Fr., Lich. Eur. Ref. (1831), p. 118. *Lecanora hilaris* Zwackh, Lich. Exs. n. 973.

Var. **thæodes** (Mass.) Wain.

Acarospora thæodes Mass., Lich. Cap. (1861). p. 55. *Placodium thæodes* Müll. Arg., Lich. Beitr. n. 119. *Lecanora thæodes* Stizenb., Lich. Afr. p. 130. *Lecanora xanthophana* Nyl., Lich. Angol. p. 8 (= *L. bella* Nyl., Add. Crypt. Chil. 1855, p. 156); conf. autem Müll. Arg., Lich. Beitr. n. 119, 1414, Lich. Austr. Occ. p. 194.

Thallus areolis plus minusve dispersis, crassioribus.

MOSSAMEDES.—Ad lapides 500 ad 600 ped. s. m. in Serra de Montes Negros. Nos. **19**, **44**.

PUNGO ANDONGO (2400 ad 3800 ped. s. m.).—Frequenter in rupibus in monte Pedra Cazella. No. **56**. Etiam a Soyaux in Pungo Andongo lecta (Müll. Arg., Lich Afr. Occ. p. 33).

Var. **tenuis** Wain.

Lecanora tersa Nyl., Lich. Angol. p. 8.

Thallus tenuis, areolis contiguis aut dispersis.

MOSSAMEDES.—Ad rupes schistosas verticales inter Maiombo et Cazimba in via ad Huillam. Nos. **17** pr. p., **18**, **160** pr. p. Ad rupes, schistosas in Serra de Cazimba inter Maiombo et Pomangula. No. **485** pr. p.

2. **A. fuscata** (Schrad.) Arn. ***A. discreta** (Ach.) Th. Fr., Lich. Scand. p. 217.

MOSSAMEDES.—Ad rupes schistosas inter Maiombo et Cazimba. No. **160** pr. p. Sine apotheciis, at cum pycnoconidiis. Pycnoconidia oblongo-ovoidea, long. 0·002 ad 0·003, crass. 0·001 mm., altero apice attenuato.

TRIB. XI.—CŒNOGONIEÆ.

1. **CŒNOGONIUM** Ehrenb.

1. **C. subvirescens** Nyl., Fl. 1874, p. 72; Wain., Etud. Lich. Brés. II. p. 66.

GOLUNGO ALTO.—Ad truncos et ramulos arborum in Serra de Alta Queta. No. **259**. Ster. Cellulæ gonidiorum (Trentepohliæ) long. 0·012 ad 0·022, crass. 0·008 ad 0·010 mm. In n. **169**, **256**, **257** et **258** in statum thallo pannose expanso instructum transit, qui thallo similis est *C. implexo* Nyl., Obs. Cœnog. p, 92, at solum sterilis adest, quare certe determinari non potest. Cellulæ gonidiorum long. 0·010 ad 0·028, crass. 0·008 ad 0·012 mm.

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TRIB. XII.—GYALECTEÆ.

1. GYALECTA (Ach.) Wain.

1. **G. plurilocularis** Wain., sp. n.

Thallus tenuis aut sat tenuis, continuus, verruculoso-inæqualis, cinerascens vel glaucescens, KHO non reagens. Apothecia innata, demum elevata, 0·8 ad 0·6 mm. lata, disco plano, rarius demum convexiusculo, pallido, margine albido, primum extus minute verruculoso-crenulato, demum subintegro, primum elevato, demum discum æquante, tenui. Perithecium parenchymatico-chondroideum, cellulis minutis, brevibus, sat pachydermaticis, amphithecio thallino, parce gonidia continente, verruculoso, parum evoluto. Hypothecium decoloratum. Hymenium totum decoloratum, circ. 0·070 mm. crassum, jodo glaucescens. Paraphyses laxe cohærentes, apice parum incrassatæ. Asci clavati. Sporæ 8næ polystichæ, fusiformes, apicibus acutis, long. 0·018 ad 0·030, crass. 0·003 mm., 4—7-septatæ. Gonidia chroolepoidea, cellulis 0·006 ad 0·010 mm. crassis. Affinis est *G. myriadellæ* (Nyl.), *G. glabellæ* (Krempelh.), *G. derivatæ* (Nyl.) et *G. aciculari* Anzi.

GOLUNGO ALTO (1000 ad 2400 ped. s. m.).—Ad truncos arborum in sylva. No. **128**.

2. **G. epiphylla** Müll. Arg., Lich. Beitr. (1881), n. 258.

Gonidia phycopeltidea. Hymenium circ. 0·040 mm. crassum, jodo leviter vinose rubens (haud cærulescens). Paraphyses arcte cohærentes, apice parum incrassatæ. Asci clavati. Sporæ 8næ, distichæ, ovoideo-fusiformes, long. 0·010 ad 0·011, crass. 0·003 ad 0·004 mm. Excipulum e cellulis minutissimis parenchymaticis formatum.

GOLUNGO ALTO.—Ad folia *Gneti* in sylvis densissimis in Alta Queta. No. **316** pr. p.

TRIB. XIII.—ECTOLECHIEÆ.

1. ECTOLECHIA Trev.

1. **E. (Gonothecium) microplaca** Wain., sp. n.

Thallus plagulas circ. 1 ad 1·5 mm. latas, rotundatas, ambitu subintegras, tenues, cinereo-albidas, crebre contextas, lævigatas, nitidulas, continuas, apothecia 1 ad 4 continentes formans, cortice ex hyphis in ambitum radiantibus, 0·005 mm. crassis, lepto-dermaticis, breviter cellulosis, conglutinatis constituto, hypothallo nullo. Apothecia thallo immersa, margine tenui, fuscescente aut albido, habitu quasi proprio, thallum leviter superante, extus sensim in thallum dilatato. Margo sub microscopio superne visus discum versus est laceratus, ex hyphis radiantibus strati corticalis thalli formatus. Discus circ. 0·2 ad 0·3 mm. latus, planus, thallum subæquans, livido-glaucescens aut testaceo-fuscescens. Hypothecium pallidum vel albidum, tenue, substrato impositum. Hymenium circ. 0·060 mm. crassum, jodo lutescens, sporis jodo subrubentibus.

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Epithecium gonidia hymenialia (diam. 0·004 ad 0·003 mm.) continens, flavescenti-pallidum vel olivaceo-flavescens, KHO non reagens, jodo fulvo-rubescens. Paraphyses arcte cohærentes, neque ramosæ, nec connexæ. Sporæ solitariæ, oblongæ, decolores, long. circ. 0·050 ad 0·054, crass. 0·014 ad 0·022 mm., murales, cellulis numerosissimis. Thallus intus jodo vinose rubens, gonidia cystococcoidea, diam. 0·007 ad 0·010 mm. continens. Excipulum in margine tenue. Affinis est *E. phyllocharide* (Mont.), quæ apotheciis magis elevatis et excipulo magis evoluto ab ea differt et intermedia est inter *E. glaucovirescentem* et *E. phyllocharidem*.

GOLUNGO ALTO.—Ad folia arboris in Serra de Alta Queta. No. **290**.

2. **E. (Gyalectidium) aspidota** Wain., sp. n.

Thallus plagulæformis, fere sicut in *Strigula*, plagulas circ. 1 ad 2 mm. latas, rotundatas, ambitu subintegras, leviter depresso-convexas, albidas vel cinereo-albidas, crebre contextas, lævigatas, nitidulas, continuas, apothecia subsolitaria continentes formans, hypothallo indistincto. Apothecia thallo urceolato-immersa, aspicilioidea, immarginata, disco 0·4 ad 0·6 mm. lato, plano, impresso, testaceo-fuscescente, strato thallino gonidiis destituto imposita. Excipulum solum ex hypothecio albido gonidiis destituto tenui formatum. Hymenium 0·050 ad 0·070 mm. crassum (in KHO bene turgescens, ad 0·120 mm. crassum), jodo lutescens, epiplasmate ascorum jodo vinose rubente. Epithecium dilute fuscescens aut pallidum. Paraphyses tenuissimæ, gelatinam in KHO turgescentem percurrentes, increbre ramoso-connexæ. Sporæ solitariæ, decolores, murales, cellulis numerosissimis, long. 0·030 ad 0·070, crass. 0·018 ad 0·050 mm. Gonidia cystococcoidea. Habitu sicut præcedens, sed thallo crassiore ab ea differens.

GOLUNGO ALTO.—Ad folia perennia fruticis prope Sange. No. **292** pr. p.

2. **ASTEROTHYRIUM** Müll. Arg.

1. **A. Welwitschii** Wain., sp. n.

Thallus crustaceus, tenuis, lævigatus, sat opacus, continuus, albidus, maculas 1 ad 2 mm. latas formans, hyphis radiantibus (ad instar cellularum Phycopeltidis), pachydermaticis, circ. 0·004 mm. crassis, in cellulas breves divisis, obductus. Gonidia globosa, diam. 0·006 ad 0·010 mm., simplicia, cystococcoidea. Apothecia thallo immersa, circ. 0·250 mm. lata, 0·120 mm. crassa, orbicularia, lobis minutis, triangularibus, vulgo circ. 4, diu plus minusve distinctis, 0·025 mm. crassis, demum indistinctis, e lateribus conniventibus discoque connatis perithecii formatis instructa. Perithecium testaceum, gonidiis destitutum aut in latere basali parce gonidia continens. Hypothecium tenue, testaceum, strato nullo gonidia continenti impositum. Hymenium 0·110 mm. crassum, pallidum, jodo non reagens, epithecio rufescenti-pallido. Paraphyses simplices (haud ramoso-connexæ), gelatinam sat copiosam percurrentes. Asci membrana tenui. Sporæ binæ, 1-septatæ, ellipsoideæ aut oblongæ, long. 0·042 ad 0·048, crass. 0·018 ad 0·024 mm., haud constrictæ, decolores aut pallidæ, membrana

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0·002 mm. crassa, haud gelatinosa. Habitu *Ectolechias* in memoriam revocat et iis sine dubio affine.

GOLUNGO ALTO.—Ad folia *Fici urceolaris* Welw. in silva primitiva prope Quisuculo una cum *Strigula hypothelia*, *Str. Africana*, *Str. atrocarpa* et *Lecidea exiguella*. No. **288** pr. p.

TRIB. XIV.—THELOTREMEÆ.

1. **THELOTREMA** (Ach.) Eschw.

1. **Th. (Leptotrema) Loandense** Wain., sp. n.

Thallus sat tenuis aut mediocris, sat lævigatus, stramineo-albicans vel stramineo-glaucescens, subopacus, KHO levissime flavescens, dein rubescens. Excipulum haud aut parum elevatum, ostiolo parvo rotundato, margine ostiolari integro, tenui, vulgo tenuissime circumscissa. Apothecia crebra, partim in lineas disposita, disco punctiformi, obscurato. Perithecium pallidum, sat tenue, jodo vinose rubens, ad basin in latere zona angusta jodo cærulescente, columella nulla. Sporæ 8næ, pallidæ et demum morbose fuscescentes, murales, septis transversalibus 5 ad 7, cellulis haud numerosis, long. 0·025 ad 0·027, crass. 0·011 ad 0·014 mm., jodo leviter violaceo-rubentes.

LOANDA (0 ad 1000 ped. s. m.).—Ad ramos *Sterculiæ* prope Teba. No. **441**.

2. **Th. (Brassia) Pechueli** Müll. Arg., Lich. Afr. Occ. p. 34.

Ad ramos in depressitate secus flumen Quillu lecta a D^re^ Pechuel-Loesche.

3. **Th. (Ocellularia) emersellum** (Müll. Arg.) Wain.

Ocellularia emersella Müll. Arg., Thelotr. Kew. (1895), p. 453. *Th. schizostomum* Krempelh. Fl. 1876, p. 222 (Wain., Etud. Lich Brés. II. p. 84), haud Tuck., Obs. Lich. (1862), p. 411.

Perithecium annulare, fulvescens, in KHO obscurius coloratum, columella fusca, circ. 0·120 mm. crassa. Epithecium decoloratum. Sporæ 8næ, distichæ, decolores, fusiformes, 3- ad 5-septatæ, long. 0·014 ad 0·018, crass. 0·006 ad 0·007 mm.

GOLUNGO ALTO.—Ad truncos cariosos prostratos in sylvis primævis in Mata de Quisuculo prope Bango. No. **208**.

2. **GYROSTOMUM** Fr.

1. **G. scyphuliferum** (Ach.) Fr.

GOLUNGO ALTO.—Ad truncos vigentes in sylvis Leguminosarum inter Sange et Trombeta 1000 ad 2400 ped. s. m. No. **133**. Ad corticem *Monodoræ* in summis montibus Cungulungulo. No. **224**.

TRIB. XV.—PILOCARPEÆ.

1. **PILOCARPON** Wain.

1. **P. leucoblepharum** (Nyl.) Wain., Etud. Lich. Brés. II. p. 89.

GOLUNGO ALTO.—Frequenter ad folia arborum sempervirentium in sylvis prope Fonte de Capopa (ad *Chytranthum Mannii*). No. **319** pr. p.

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TRIB. XVI.—LECANACTIDEÆ.

1. LECANACTIS (Eschw.) Wain.

1. **L.** (subg. **Eulecanactis**) **flava** Wain., sp. n.

Thallus tenuis, flavescens, sat lævigatus, linea hypothallina passim limitatus. Apothecia crebra, elevata, primum orbicularia, demum anguloso-rotundata, circ. 0·4 ad 0·6 mm. lata. Perithecium fuligineum, integrum. Discus apertus, planus aut demum convexiusculus, flavescenti-pruinosus. Margo fuligineus, tenuis, persistens. Hypothecium fuscescens. Hymenium circ. 0·080 mm. crassum, jodo subpersistenter cærulescens, metaplasmate ascorum vinose rubente. Epithecium dilute fuscescens, parte summa flavescente, KHO non reagens. Paraphyses ramoso-connexæ, apice ramosæ. Asci clavati. Sporæ 8næ, ovoideo-oblongæ, apicibus obtusis aut rotundatis, 3-septatæ, long. 0·015 ad 0·016, crass. 0·004 ad 0·005 mm., decolores, morbosæ demum nigricantes. Affinis est *L. chloroconiæ* Tuck., quæ thallo cinereo ab ea differt.

LOANDA.—Ad ramulos fruticum (*Balsamodendron* et *Adansonia digit.*) in collinis aridis maritimis prope Boa Vista et Maianga do Povo. Nos. **186**, **186***b*.

2. **L.** (subg. **Arthoniactis**) **ostrearum** Wain., sp. n.

Thallus indistinctus, ex hyphis tenuibus anastomosantibus formatus. Gonidia chroolepoidea, cellulis circ. 0·008 ad 0·010 mm. crassis, concatenatis (in ClH visa). Apothecia crebra, parce etiam confluentia, demum elevata, orbicularia, 0·3 ad 0·6 mm. lata, basin versus sensim dilatata neque constricta, habitu acarosporoidea aut aspicilioidea. Perithecium fusco-fuligineum, basi tenue, KHO non reagens. Discus apertus, impressus, fere punctiformis, circ. 0·1 ad 0·15 mm. latus, fusco-nigricans, nudus, margine elevato cinctus. Hypothecium fuscescens. Hymenium circ. 0·050 mm. crassum, jodo non reagens. Epithecium pallidum, KHO non reagens. Paraphyses ramoso-connexæ. Asci clavati, circ. 0·025 ad 0·030 mm. lati, apice membrana incrassata. Sporæ 8næ, distichæ, decolores, ovoideo-oblongæ, apicibus rotundatis, 1-septatæ, septo in medio, halone nullo indutæ, long. 0·016 ad 0·018, crass. 0·006 ad 0·008 mm.

INSULA PRINCIPIS (in sinu Benin sub æquatore).—Ad Ostreas juxta litus Oceani prope Bahia de St. Antonio. No. **229**. Subgenus *Arthoniactis* sporis 1-septatis a subg. *Eulecanactide* differt. A Müll. Arg. et aliis auctoribus species plures *Opegraphæ* ad *Lecanactidem* false adductæ sunt. *Lecanactideæ* veræ in *Patellarias* inter fungos cyclocarpeos transeunt (vide Wain., Lich. Antill. p. 24), neque in *Hysterieas*, quare ad *Graphideas* pertinere non possunt, sed tribum autonomum inter Cyclocarpeas constituunt.

B. *HYSTERIEÆ.*

TRIB. 1.—ROCCELLEÆ.

Ut S. Almquist (Om. Skand. Schism. Opegr. 1869, p. 5), J. Reinke (Abhandl. Flecht. p. 158) et O. V. Darbishire (Monogr.

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Roccell. p. 8) indicaverunt, *Roccelleæ* affinitatem cum Graphideis ostendunt. Ad instar apotheciorum Graphidearum, in generibus insignibus *Reinkella* et *Ingaderia*, a Darbishire detectis, apothecia, quæ auctor mihi communicavit, et quæ parasitæ non esse videntur, jam ab origine lirelliformia sunt. In genere *Roccella* hic character valde degeneratus est, at etiam ibi apothecia ellipsoidea irregularia cum apotheciis orbicularibus observantur. In *Dirina multiformi* Mont. (paraphysibus haud connexis a *Platygrapha* differente), ad Graphideas pertinente, apothecia item lirelliformia sunt, at in aliis speciebus hujus generis plus minusve (sed haud omnino) orbicularia. In genere *Roccellina* (Darb., *l.c.*, p. 56) evolutio thalli fruticulosi e typo crustaceo (fere sicut in *Thallœdœmate*) observari potest. In genere *Roccella* igitur minime adsunt podetia e stipite apotheciorum evoluta, sed verus thallus fruticulosus (stroma fruticulosum) in mycelio nascens. Si in statu juvenili evolutio thalli indagatur, quo modo solo certum judicium de natura morphologica membrorum plantæ haberi potest, observatur hoc mycelium vel protothallum *Roccellæ* post evolutionem stromatis fruticulosi non deperire, sed hyphis e stromate fruticuloso excrescentibus auctum, in placentam, mycelio subsimilem aut in pluribus speciebus etiam stroma crustaceum parvum corticatum gonidiiferumque formantem, evolvi. Hæc placenta igitur morphologice neque est analoga thallo primario Cladoniarum, nec omnino hypothallo fruticuloso Cladoniarum, e basi podetiorum excrescenti, morphologice respondet, etiam aliam structuram anatomicam et aliam staturam habens, et eam ob causam alio nomine designanda est. Placenta *Roccellarum*, sicut hypothallus *Cladoniarum* (conf. Wain., Monogr. Clad. III. p. 8), etiam novos thallos producere potest.

1. **ROCCELLA** Ach.

1. **R. tinctoria** DC., Fl. Fr. 3, ed. ii. p. 334; Ach., Lich. Univ. p. 439 (secund. herb. Ach.); Darb., Mon. Roccell. p. 32 pr. p. (specimina esorediata).

In hac specie thallus est esorediatus, quare specimina sorediosa, sterilia, huc a pluribus auctoribus ducta, sejungenda sunt et ad *Roccellam Arnoldi* Wain. (Arn., Lich. Exs. n. 1689) pertinent. *R. Canariensis* (Darb., *l.c.*, p. 50 pr. p.) sporis majoribus et reactionibus thalli (thallus neque KHO nec $CaCl_2O_2$ reagens, medulla jodo cærulescens) a *R. tinctoria* differt. *R. Sinensis* Nyl. his reactionibus cum *R. tinctoria* congruit, at thallo minore apotheciis peltatis basique constrictis et sporis ab ea differt.

Var. **subpodicellata** Wain.

Thallus long. circ. 8 ad 15 cent., basin versus crass. circ. 1·5 ad 4 mm., prostratus, livido-albidus, pruinosus, KHO non reagens, $CaCl_2O_2$ rubescens, esorediatus, ramis omnibus teretibus aut vetustioribus compressiusculis, rigidis. Apothecia pruinosa, primum innata, demum elevata et basi plus minusve constricta, vetusta etiam breviter stipitata, primum plana marginataque,

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demum convexa et sæpe etiam immarginata, lateralia. Sporæ fusiformes, 3-septatæ, long. 0·015 ad 0·021, crass. 0·0045 ad 0·005 mm., leviter curvatæ, decolores, apicibus obtusis. Medulla jodo cærulescens. F. *dichotoma* Ach. secund. herb. Ach. apotheciis sessilibus (non stipitatis) a f. *subpodicellata* differt.

MOSSAMEDES.—Ad rupes Oceani Atlantici prope Cazimba (via versus Cabo Negro). No. **406** pr. p.

F. **complanata** Wain.

Thallus longitudine circ. 15 ad 20 cm., ramis vetustioribus circ. 4 ad 2 mm. latis, plus minusve compressis, ramis junioribus anguloso-compressis, KHO non reagens, $CaCl_2O_2$ rubescens, esorediatus, rigidus. Medulla jodo cærulescens. Apothecia lateralia, pruinosa, demum breviter stipitata.

MOSSAMEDES.—Ad rupes Oceani Atlantici prope Cazimba (via versus Cabo Negro). No. **406** pr. p.

"Formam cylindricam et complanatam non raro eadem in rupe inveni" (Welw. in sched.).

2. **R. Africana** Wain., n. sp.

Thallus elongatus, long. circ. 20 ad 25 cent., basin versus crass. circ. 1·5 ad 2 mm., livido-pallescens, leviter pruinosus, KHO rubescens, $CaCl_2O_2$ rubescens, esorediatus, rigidus, ramis omnibus teretibus aut ad axillas plus minusve compressis dilatatisque. Apothecia lateralia, basi constricta, demum sæpe subpodicellata, marginata, disco planiusculo, pruinoso. Sporæ long. circ. 0·024, crass. 0·005 mm., rectæ aut leviter curvatæ, fusiformes, apicibus acutis. Hymenium jodo non reagens aut passim levissime cærulescens. Medulla jodo cærulescens.

BENGUELLA.—Inter *Roccellam* ad portum Novo Rodondo advectam legit A. Lopes de Silva. No. **405**.

Reactione thalli a *R. tinctoria* et *R. portentosa* Mont. differt, a posteriore etiam apotheciis basi constrictis. In *R. portentosa* et *R. dubia* Darb. thallus neque KHO nec $CaCl_2O_2$ reagens, medulla jodo cærulescens.

3. **R. hypomecha** (Ach.) Nyl. in Hue, Lich. Exot. p. 60; Darb., Mon. Rocc. p. 37.

Var. **isabellina** Wain.

Thallus esorediatus, opacus, teres, leviter pruinosus, pallescens aut testaceus, neque KHO, nec $CaCl_2O_2$ reagens.

MOSSAMEDES.—Ad rupes maritimas loco dicto Cazimba inter Mossamedes et Porto Pinda parce et sterilis. No. **404**.

R. dubia Darb. et *R. Canariensis* (Darb.) reactionibus solitis huic variationi congruunt et habitu thalli parum ab ea differunt, at thallo epruinoso ab ea distinguuntur.

Var. **Benguellensis** (Welw.) Wain.

Thallus esorediatus, albus, neque KHO, nec $CaCl_2O_2$ reagens.

MOSSAMEDES.—Ad rupes juxta Oceanum Atl. prope Cabo Negro. No. **403**.

Apothecia demum sessilia, convexa, hemisphærica, basi leviter constricta, margine simplice thallode albido. Hypotheciuni fuscofuligineum. Sporæ long. 0·020 ad 0·016, crass. 0·005 ad 0·0035 mm., rectæ

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aut parce curvatæ. Thallus rigidus, vulgo teres, 1 ad 0·7 mm. crassus. Medulla jodo cærulescens.

R. Gayana Mont. (Darb., *l.c.*, p. 40) medulla jodo haud cærulescente (thallus neque KHO nec $CaCl_2O_2$ reagens) a *R. hypomecha* differt.

4. **R. tuberculata** Wain., sp. n.

R. Canariensis Darb., Mon. Rocc. p. 50 pr. p. (specimina sorediosa).

Thallus rigidus, long. 30 ad 80 mm., basin versus crass. 3 ad 0·7 mm., livido-albescens, pallescens aut fuscescens, epruinosus, soraliis tuberculiformibus aut saltem margine elevatis instructus, neque KHO, nec $CaCl_2O_2$ reagens, dichotome repetito-ramosus, ramis teretibus. Medulla alba, jodo leviter cærulescens.

INS. CAPITIS VIRIDIS.—Ad rupes in insula Fogo leg. Pharmacop. Torres. No. **419**. Ster.

Var. **Vincentina** Wain.

Thallo passim leviter pruinoso et soraliis $CaCl_2O_2$ rubentibus a *R. tuberculata* differt, at forsan non est autonoma species. Ceterum thallus neque KHO nec $CaCl_2O_2$ reagens. Medulla alba, jodo cærulescens. Soralia elevata.

INS. CAPITIS VIRIDIS.—Hinc inde ad rupes maritimas insulæ S. Vincentii. No. **402** pr. p.

5. **R. Mossamedana** Wain., sp. n.

Thallus livido-pallescens aut albidus, soraliis cinereis, haud aut vix elevatis instructus, KHO rubescens, $CaCl_2O_2$ non reagens, rigidus, long. circ. 25 ad 30 mm., basin versus crass. circ. 0·5 ad 0·7 mm., crebre dichotome repetito-ramosus, ramis teretibus. Medulla alba, jodo haud reagens.

MOSSAMEDES.—Ad rupes in summis jugis Serra de Montes Negros. No. **418**. Ster.

6. **R. Arnoldi** Wain.

R. tinctoria Darb., *l.c.*, p. 32 pr. p. (specimina sorediosa); Arn., Lich. Exs. n. 1689.

Thallus rigidus, ramis teretiusculis, passim levissime pruinosus, sorediosus, glaucescens aut fuscescens, KHO non reagens, $CaCl_2O_2$ rubescens, etiam soralia $CaCl_2O_2$ rubescentia. Medulla basis et placentæ alba, jodo cærulescens. Habitu similis est *R. fucoidi* (Dicks.) Wain. (*Lichen fucoides* Dicks., Crypt. Fasc. ii. 1790, p. 22, secund. specim. authent. in herb. Ach. ad *R. phycopsin* Darb. vel *R. phycopsin* Ach., Lich. Univ. 1810, p. 440 pr. p., spectat), at colore medullæ placentæ ab ea differt, reactionibus, KHO, $CaCl_2O_2$ et jodo productis, cum ea congruens. In *R. difficili* Darb., *l.c.*, p. 49, thallus KHO non reagens, $CaCl_2O_2$ leviter rubescens, soralia $CaCl_2O_2$ non reagentia, medulla jodo cærulescens. In *R. Caribæa* Darb., *l.c.*, p. 53, thallus neque KHO nec $CaCl_2O_2$ reagens, soralia $CaCl_2O_2$ rubescentia, medulla jodo cærulescens. *R. Arnoldi* tantum sterilis est cognita, at saltem thallo sorediosa *R. tinctoria* differt. In *Roccellis*, sicut in speciebus plurimis lichenum, præsentia et absentia soralium nota est valde constans.

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Quum non est constans, specimina sorediosa et esorediata transeunt. Ita forsan res se habet in nonnullis speciebus *Roccellarum*, at minime in speciebus plurimis.

MOSSAMEDES.—Frequenter ad rupes calcareas inter Saco et Boca de Rio Giraûl. No. **417** pr. p. Ster.

7. **R. linearis** Wain., sp. n.

R. fuciformis α. *R. linearis* Ach., Lich. Univ. (1810), p. 440 pr. p. (specimen e Sumatra in herb. Ach.; specimen e Nova Hispania ad *R. fuciformem* DC. pertinet). *R. Montagnei* Nyl. in Hue, Lich. Exot. p. 61 pr. p.; Darb., Mon. Roccell. p. 24 pr. p.

Thallus sat mollis, compressus, epruinosus, $CaCl_2O_2$ superne rubescens, intus leviter rubescens, soraliis minutis, parum elevatis. Medulla jodo bene cærulescens. Stratum medullare placentæ albidum. Solum sterilis visa.

Var. **primaria** Wain.

Soralia $CaCl_2O_2$ non reagentia (sicut in specim. orig. in herb. Ach.). Thallus KHO non reagens.

LOANDA.—Ad *Rhizophoram* in insula Loanda. No. **409** pr. p. Frequentissime ad ramos *Adansoniæ*, *Euphorbiæ candel.* aliarumque arborum inter Loanda et Quicuje. No. **413**. Inter Camama et Calumbo prope Loanda. No. **414**.

LIBONGO.—Frequenter ad *Hyphæn. coriaceam*, *Chrysobalanum* et omnes fere frutices littorales inter Libongo, Bombo et Barra do Bengo. No. **411**.

BENGUELLA.—Frequenter ad varias species *Acaciæ* prope urbem Benguella. No. **412** pr. p.

ZENZA DO GOLUNGO (regio littor. et superior). — Ad truncos *Adansoniarum* circa Calungembo, at hac in distantia ab Oceano jam valde rara. No. **415**.

MOSSAMEDES.—Ad *Euphorbiam bellicam* prope Mossamedes. No. **420**.

AMBRIZ.—Ad ramulos fruticum maritimorum inter Ambriz et flumen Lifune.

Var. **hyperchromatica** Wain.

Soralia $CaCl_2O_2$ rubescentia. Thallus KHO non reagens.

LOANDA.—Ad rupes maritimas non procul a Morro de Santa Catharina, at non frequens. No. **422** pr. p.

Huc etiam pertinent Zw. Lich. Exs. n. 517 (ex Angola), n. 518 (St. Paul de Loanda). *R. fuciformis* DC. thallo rigidiore et crassiore, extus $CaCl_2O_2$ non reagente ab hac variatione differt. *R. Peruensis* (Krempelh.) Wain. (Darb., Mon. Roccell. p. 47 pr. p.: specimina sorediosa) medulla basis lutea ab hac variatione distinguitur. *R. Babingtonii* Mont., Syll. p. 321, thallo esorediato a *R. Peruensi* differt.

Var. **Guineensis** Wain.

Thallus KHO demum solutionem leviter rubescentem effundens, $CaCl_2O_2$ rubescens. Soralia $CaCl_2O_2$ haud reagentia.

INSULA S. THOMÆ.—Ad rupes maritimas. No. **421**. Ster.

Ad *R. linearem* pertinet etiam *R. Montagnei* v. *rigidula* Müll. Arg., Lich. Beitr. (1879), n. 126, Lich. Afr. Occ. (Linnæa 1880), p. 31, ad Chinchoxo (v. *hyperchromatica*) et Landana (v. *primaria*) a Pechuel-

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Loesche lecta (secund. herb. Müll.). Conf. Darb. Mon., Roccell. p. 90, tab. 6, fig. 21.

8. **R. Montagnei** Bél., Voy. Ind. Or. p. 117 (secund. specim. authent. e Madagascaria in coll. Welw. n. 401); Nyl. in Hue, Lich. Exot. p. 61 pr. p.

R. fuciformis Ach., Lich. Univ. p. 440 (excl. var.) secund. herb. Ach. *Lichen fuciformis* L., Sp. Pl. n. 38, secund. icon. cit. Dill. pr. p. ad *R. Montagnei* Bél., pr. p. ad *R. fuciformem* DC. spectat.

Thallus compressus, sæpe etiam angulosus, epruinosus, mollis, esorediatus, $CaCl_2O_2$ extus rubescens, intus non reagens, KHO non reagens. Apothecia lecanorina, basi constricta, sessilia, disco plano aut rarius demum convexo, margine persistente. Medulla jodo cærulescens. Rami elongati aut breves, angusti aut dilatati, lævigati aut reticulatim nervosi, pallidi aut glaucescenti-albidi. Medulla placentæ et basis thalli alba aut ochracea (etiam in specim. orig. Bélang. ochracea, sed haud lutea).

LOANDA.—Ad ramulos *Avicenniæ* et *Rhizophoræ* prope Zamba grande. No. **410**. Frequentissime ad truncos et ramos vigentes et siccos arborum et fruticum juxta litus Angolæ, at in ditione Loandensi rarissime fructificans.

BENGUELLA.—Ad truncos ramulosque *Acaciarum* in montosis inter urbem Benguella et Serra das Bimbas. Nos. **401** (fert.), **412** pr. p. (ster.).

AMBRIZ.—Ad *Acacias* et *Anacardias* in territorio Mossulensi. No. **408**. Fert. Hæc specimina ad f. *obtusam* Wain., laciniis latis (7 ad 2 mm.) obtusisque thalli dignotam, pertinent.

9. **R. podocarpa** sp. n. Welw. in herb.

Thallus elongatus, long. circ. 1 ad 2 decim., mollis, epruinosus, ramis crassioribus plus minusve compressis, circ. 2 ad 6 mm. latis, ramis tenuioribus leviter aut parum compressis, esorediatus, glaucescenti-albidus, extus $CaCl_2O_2$ rubescens, intus non reagens, KHO non reagens, lævigatus aut rugulosus aut angulosus. Medulla basis thalli et placentæ alba, jodo cærulescens. Apothecia elevata, basi constricta, jam sat juvenilia breviter podicellata, disco plano aut demum convexiusculo, pruinoso, margine lecanorino, simplice, persistente. Hypothecium fuscum. Sporæ fusiformes, decolores, 3-septatæ, rectæ aut leviter curvatæ, long. 0·022 ad 0·026, crass. 0·004 ad 0·0045 mm., apicibus obtusis. *R. Mauritiana* (Darb., *l.c.*, p. 46 pr. p., excl. specim. sorediosis) secund. specim. in herb. Müll., reactionibus a $CaCl_2O_2$ et KHO productis cum hac specie congruit, at apotheciis solum demum substipitatis (sporis tenuioribus, observante Darb.) et thallo rigido minoreque ab ea differt. *R. Balfourii* Müll. Arg., Diagn. Lich. Socot. p. 43, secund. specim. in herb. Müll. item reactionibus cum *R. podocarpa* congruit, at thallo brevi ab ea differt (apothecia partim stipitata). Etiam in *R. decipiente* Darb. et *R. flaccida* Darb. thallus $CaCl_2O_2$ rubescens, at KHO non reagens.

AMBRIZ.—Ad ramos *Adansoniæ digitatæ* retro Mubango in interioribus ex Ambriz. No. **407**. Fert.

MOSSAMEDES.—Ad ramulos *Tamaricis* et *Acaciarum* juxta ripas fluminis Maiombo prope Páo. No. **416**. Ster.

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TRIB. II.—GRAPHIDEÆ.

1. GRAPHIS (Adans.) Nyl.

1. **Gr. (Phæographina) Montagnei** V. d. Bosch in Mont. Syll. p. 346.

Phæographina Montagnei Müll. Arg., Lich. Beitr. n. 483 (156).

***Gr. deducta** (Nyl.) Wain.

**Lecanactis deducta* Nyl., Fl. 1886, p. 176. **L. deducens* Nyl., Lich. Guin. (1889), p. 32.

INS. PRINCIPIS.—Ad corticem arboris in Pico de Papagaio. No. **395**. Hymenium rubescens, epithecio rubro-fuligineo. Perithecium integrum, fuligineum. Sporæ solitariæ, murales, dilute fuscescentes, long. circ. 0·070 ad 0·090, crass. 0·022 ad 0·026 mm.

2. **Gr. pachnodes** Fée, Ess. Crypt. Ecorc. p. 34, tab. 8, fig. 4.

Phæographina pachnodes Müll. Arg., Graph. Féean. p. 50.

Thallus albido-glaucescens, KHO lutescens et demum rubescens. Perithecium pallidum, tenue. Hymenium jodo non reagens. Epithecium pallidum. Sporæ 8næ, obscuratæ, murales, septis transversalibus 7 ad 8, long. 0·019 ad 0·032, crass. 0·008 ad 0·012 mm. Apothecia margine albido, crassitudine mediocri, discum et thallum superante. Discus cæsiopruinosus. Affinis est *Gr. ornatæ* (Müll. Arg., Lich. Beitr. n. 1050).

GOLUNGO ALTO.—Ad corticem arboris Euphorbiaceæ in editis in Quilombo Quiacatubia. No. **379**. Ad corticem arboris Bombolodictæ (*Melia dubia*) prope Cungulungulo. No. **377**.

3. **Gr. fuscescens** Wain., sp. n.

Thallus crassitudine mediocris, circ. 0·3 mm., areolato-rimosus, lævigatus, subopacus, obscure fuscescens. Apothecia sæpe approximata aut in serie brevi disposita, rotundata aut oblonga, long. 0·3 ad 1 mm., latit. 0·3 ad 0·2 mm., thallo immersa. Discus urceolato-impressus, nigricans, nudus, immarginatus. Perithecium tenuissimum, pallidum. Hymenium jodo non reagens. Epithecium pallidum, KHO non reagens. Paraphyses simplices aut pr. p. apicem versus parcissime ramoso-connexæ, apice haud incrassatæ. Sporæ solitariæ, murales, fuscescenti-pallidæ, long. circ. 0·110, crass. 0·026 mm. Medulla thalli KHO rubescens.

GOLUNGO ALTO.—Ad corticem *Fici pseudoelasticæ* prope Rodrigo. No. **443**.

4. **Gr. (Graphina) subserpentina** Nyl., Lich. Nov.-Gran. p. 465, ed. 2, p. 360.

Thallus glaucescens, KHO levissime flavescens et demum fuscescens. Perithecium fuligineum, dimidiatum, labiis superne anguste denudatis, haud striatis, thallo immersum aut sæpe demum amphithecio thallino abrupte leviter elevato. Sporæ solitariæ, murales, cellulis numerosissimis, decolores, jodo violascentes, long. 0·070 ad 0·110, crass. 0·018 ad 0·026 mm.

AMBRIZ.—Ad corticem truncorum vetustorum (Encumbi i.e. *Calesiam antiscorbutica*). No. **391**.

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5. **Gr. Ambrizensis** Wain., sp. n.

Thallus tenuis, continuus, opacus, sat lævigatus, albidus, KHO lutescens et demum rubescens, hypothallo obscurato partim limitatus. Apothecia approximata, elongata, long. circ. 6 ad 2 mm., latit. circ. 0·4 ad 0·3 mm., simplicia aut parcius ramosa, vulgo curvata aut flexuosa, demum leviter elevata, basi abrupta aut constricta. Perithecium latere fuligineum, basi albidum, labiis conniventibus, demum passim anguste hiantibus, superne denudatis, inferne amphithecio thallino obductis. Discus rimæformis aut demum leviter dilatatus, nigricans, nudus. Hymenium jodo non reagens. Epithecium fuscescens. Sporæ solitariæ, murales, decolores, jodo violascentes, long. 0·054 ad 0·065, crass. 0·014 ad 0·016 mm. Comparabilis cum *Gr. subcontorta* Müll. Arg., Lich. Parag. p. 24, quæ sporis majoribus differt.

AMBRIZ.—Ad corticem arboris Encumbi (i.e. *Calesiam antiscorbutica*). No. **392**.

6. **Gr. obtecta** (Nyl.) Wain. Nyl., Lich. Nov.-Gran. ed. 2, p. 368 (excl. var.), Fl. 1869, p. 72 (pro parte).

Graphina obtecta Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 37; Lich. Beitr. n. 474.

Ad cortices secus flumen Quillu leg. Pechuel-Loesche teste Müll. Arg., Lich. Afr. Occ. p. 37.

INS. PRINCIPIS.—Ad truncos arborum. No. **359**.

7. **Gr. subnitida** Nyl. in Leight. Lich. Amaz. p. 453; Nyl., Lich. Guin. p. 49; Wain., Lich. Antill. p. 25.

GOLUNGO ALTO.—Ad corticem arboris Zanthoxylaceæ in Alta Queta. No. **356** pr. p. Sporæ 8næ, decolores aut dilutissime pallescentes, jodo non reagentes, septis transversalibus circ. 10, cellulis sat numerosis, long. 0·025, crass. 0·012 mm.

8. **Gr. sorediella** (Müll. Arg.) Wain.

Graphina sorediella Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 38.

Corticola in planitie depressa secus flumen Quillu a Pechuel-Loesche lecta.

9. **Gr. straminea** Wain., sp. n.

Thallus crassitudine mediocris, continuus, leviter subgranuloso-inæqualis, opacus, stramineus aut rarius testaceo- vel ochraceo-stramineus, neque KHO, nec Ca Cl_2O_2 distincte reagens. Apothecia oblonga aut difformia, long. circ. 2·5 ad 0·7, latit. 0·7 ad 0·6 mm., leviter elevata. Discus planus, stramineo-pruinosus aut demum denudatus nigricansque, amphithecio thallino perithecium tenue obducente, leviter elevato, basi constricto, labiis hiantibus, crassitudine mediocribus instructo cinctus. Perithecium laterale et basale tenue, fusco-rufescens aut pallidum. Epithecium pallidum aut flavescens. Hymenium jodo non reagens. Sporæ solitariæ, murales, cellulis numerosissimis, decolores, jodo violascentes, long. circ. 0·110 ad 0·150, crass. 0·025 ad 0·040 mm. Amphithecium intus jodo cærulescens. Medulla thalli jodo non reagens.

Var. **flavida** Wain. Thallus stramineus.

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GOLUNGO ALTO.—Ad corticem truncorum vetustorum in sylvis primitivis prope Sange. Nos. **396** pr. p., **458**.

Var. **testacea** Wain. Thallus testaceo- vel ochraceo-stramineus.

GOLUNGO ALTO.—Ad corticem arborum in sylvis primitivis ad Cungulungulo. No. **384**.

10. **Gr. ulcerata** Wain., sp. n.

Thallus sat crassus aut mediocris (circ. 0·6 ad 0·3 mm.), rimosus aut rimoso-areolatus, lævigatus, subnitidus aut fere opacus, pallido-glaucescens, KHO lutescens et demum rubescens. Apothecia approximata, elongata aut rotundata difformiave, simplicia aut parce ramosa, long. circ. 2 ad 0·2 mm., 0·15 ad 0·25 lata, thallo immersa. Discus apertus, cæsio-pruinosus, impressus, thallo marginatus. Perithecium pallidum, tenue. Hymenium haud oleosum, jodo non reagens. Epithecium pallidum. Sporæ solitariæ, murales, cellulis numerosissimis, decolores aut dilute pallidæ, jodo violascentes, long. 0·075 ad 0·106, crass. 0·030 ad 0·044 mm.

GOLUNGO ALTO.—Ad corticem truncorum vetustorum in Cungulungulo. No. **245**.

11. **Gr. (Phæographis) navicularis** Wain., sp. n.

Thallus tenuis, continuus, subopacus, glaucescenti-albidus, leviter verruculoso-inæqualis, KHO non reagens, hypothallo indistincto. Apothecia oblonga aut elongata, long. 0·5 ad 2·5 mm., latit. 0·2 mm., simplicia aut parce ramosa, recta aut rarius leviter curvata, elevata, apicibus acutiusculis aut obtusis. Perithecium fuligineum, dimidiatum, basi deficiens aut tenue fuscescensque, labiis nudis, lævigatis, sat tenuibus, conniventi-hiantibus. Discus dilatatus, nigricans, nudus. Hymenium jodo non reagens, asci vinose rubentes. Epithecium fuscescens. Paraphyses apice capitatæ. Sporæ 4—8næ, rarius etiam 3næ, nigricantes, 5-septatæ, loculis lenticularibus, oblongæ, apicibus rotundatis aut obtusis; jodo parum reagentes, 0·020 ad 0·030, crass. 0·006 ad 0·008 mm.

LOANDA.—(0 ad 1000 ped. s. m.).—Ad corticem arborum et fruticum prope Teba et Cacuaco. No. **371**. Prope Maianga d'el Rei. No. **372**.

12. **Gr. phyllocharis** Wain., sp. n.

Thallus crassitudine mediocris, maculas parvas irregulares formans, nitidiusculus aut subopacus, glaucescenti-albidus, sat lævigatus, KHO non reagens, hypothallo indistincto. Apothecia ellipsoidea aut oblonga, long. 0·4 ad 1 mm., latit. 0·2 ad 0·25 mm., simplicia, recta aut curvata, thallo immersa. Discus dilatatus, nigricans, nudus. Perithecium tenue, parum distinctum, in margine fuscofuligineum. Paraphyses apice fusco-clavatæ. Sporæ 8næ, obscuratæ, 5-septatæ, loculis lenticularibus, oblongæ, apicibus obtusis aut rotundatis, jodo cærulescentes, long. 0·020 ad 0·022, crass. 0·006 ad 0·007 mm.

GOLUNGO ALTO.—Ad folia perennia arbusti Sapindacei in sylvis montosis densis prope Fonte Capopa. No. **393** pr. p. Solum parcissime visa.

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13. **Gr. sexlocularis** Wain., sp. n.

Thallus hypophlœodes, macula pallida indicatus. Thallus et apothecia (epithecium) KHO crystalla rubra formantia. Apothecia oblonga aut ellipsoidea, long. 1·5 ad 0·3, lat. 0·3 ad 0·2 mm., leviter elevata, simplicia aut rarius parce ramosa, recta aut leviter curvata. Discus dilatatus, nigricans, denudatus aut tenuissime cæsio-pruinosus, margine tenui thallino albido cinctus. Perithecium tenue, integrum, nigricans. Hypothecium fuscum aut superne albidum. Hymenium jodo non reagens. Sporæ 8næ, distichæ, fuscescentes, 5-septatæ, oblongæ, apicibus obtusis aut rotundatis, jodo fuscescenti-rubentes, long. 0·018 ad 0·028, crass. 0·006 ad 0·007 mm. Affinis est *Gr. medusæformi* Kremp.

GOLUNGO ALTO.—Ad truncos *Zygiæ* (*Albizziæ coriariæ*) juxta riv. Quiapose. No. **345** pr. p.

14. **Gr. labyrinthica** (Ach.) Wain.

Glyphis Ach., Syn. Lich. p. 107. *Sarcographa* Müll. Arg., Graph. Féean. p. 62, Lich. Beitr. n. 1102.

Thallus KHO non reagens. Pseudostromata KHO lutescentia et demum fulvescentia. Hymenium jodo non reagens. Sporæ 8næ, fuscescentes, 3- ad 5-septatæ, loculis lenticularibus, oblongæ apicibus obtusis, fuscescentes, jodo sordide rubentes, long. 0·015 ad 0·020, crass. 0·006 ad 0·008 mm. Discus pruinosus.

GOLUNGO ALTO.—Ad corticem *Zanthoxyli* in sylvis primitivis editioribus in Serra de Alta Queta. Nos. **339**, **340** pr. p.

15. **Gr. sericea** (Eschw.) Wain.

Leiogramma sericeum Eschw. in Mart. Fl. Bras., p. 99. *Glyphis sericea* Nyl., Prodr. Nov.-Granat. Addit. p. 341. *Phæographis* Müll. Arg., Fl. 1888, p. 523.

Habitu similis est *Gr. medusæformi* Krempelh. (Wain., Etud. Lich. Brés. II., p. 115). Thallus nequidem circa apothecia KHO reagens. Pseudostromata haud distincta. Apothecia ramosa aggregataque. Discus tenuissime livido-pruinosus. Hymenium jodo dilute rubescens. Epithecium fuscum. Sporæ 8næ, distichæ, fuscescentes, 3-septatæ, long. 0·015 ad 0·020, crass. 0·006 ad 0·007 mm. Hypothecium fuscescens.

GOLUNGO ALTO.—Ad corticem arboris in sylvis primitivis prope Cungulungulo. No. **383**. Ad truncos vigentes *Spondiadis* prope Sange. No. **385**.

16. **Gr. (Scolæcospora) dracænæ** Wain., sp. n.

Thallus tenuis, albidus, opacus, continuus, parce granulosus, KHO lutescens et demum rubescens, inferne jodo cærulescens, hypothallo nigricante limitatus. Apothecia sat approximata, elongata, long. 2·5 ad 0·7, latit. 0·2 ad 0·15 mm., ramosa, flexuosa curvataque, elevata. Perithecium fuligineum, integrum, partim basi tenue, labiis conniventibus, lævigatis, superne denudatis, inferne anguste amphithecio thallino parum distincto obductis. Discus rimæformis, inconspicuus. Epithecium fuscescens. Sporæ 8næ, distichæ, 7- ad 9-septatæ, decolores, jodo cæruleoviolascentes, long. 0·024 ad 0·026, crass. 0·007 mm. Subsimilis est *Gr.*

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anfractuosæ Eschw. (in Mart. Fl. Bras. p. 86, Müll. Arg., Fl. 1888, p. 511, Krempelh., Warm. Lich. Bras. p. 26), quæ sporis majoribus et reactionibus ab ea differt.

GOLUNGO ALTO.—Ad truncos *Dracænæ parvifloræ* Bak. in sylvis editis primitivis ad Carengue. No. **397** pr. p.

17. **Gr. ochroplaca** (Nyl.) Wain.

Gr. scripta **ochroplaca* Nyl., Lich. Angol. p. 14.

Thallus tenuis, sat continuus, opacus, ferruginoso-ochraceus, passim parce albidus, KHO non reagens. Apothecia sat approximata, vulgo elongata, long. 2 ad 0·3 mm., latit. 0·15 ad 0·1 mm., simplicia aut parce ramosa, partim flexuosa curvatave, elevata. Perithecium fuligineum, integrum, basi tenue, labiis conniventibus, lævigatis, superne denudatis, inferne amphithecio thallino parum distincto anguste obductis. Discus rimæformis, inconspicuus. Epithecium fuscescens. Sporæ 8næ, distichæ, 6- ad 8-septatæ, decolores, long. 0·020 ad 0·024, crass. 0·006 ad 0·007 mm., jodo violascentes.

GOLUNGO ALTO.—Ad corticem trunci putrescentis in silva prope Sange. No. **396**.

18. **Gr. scripta** (L.) Ach.

GOLUNGO ALTO.—Ad truncum *Fici pseudoelasticæ* prope Sange. No. **381** pr. p. Discus apertus, nudus. Perithecium fuligineum, dimidiatum, basi deficiens aut tenue. Paraphyses fusco-capitatæ. Sporæ 8næ, 8- ad 9-septatæ, decolores, jodo violascentes, long. circ. 0·026, crass. 0·007 mm.

19. **Gr. tenella** Ach., Syn. Lich. p. 81; Wain., Etud. Lich. Brés. II. p. 121.

GOLUNGO ALTO.—Ad corticem *Fici pseudoelasticæ* (no. **381** pr. p.) et Spondiacearum (nos. **347** pr. p., **365**) prope Sange. Ad corticem *Zygiæ* juxta riv. Quiapoze prope Sange (nos. **345** pr. p., **386**). Ad corticem arboris Zanthoxylaceæ in montibus (no. **356** pr. p.) et ad corticem *Swieteniæ* in sylvis primitivis (no. **366**) in Alta Queta prope Sange. Ad corticem *Zygiæ* in palmetis juxta ripas rivi Quiapoze prope Sange (nos. **225**, **454**). Ad corticem *Mimosæ* prope Camilungo (no. **352**). Ad corticem *Spondiadis* prope Trombeta (no. **388**). Ad corticem *Dracænæ* in sylvis editis primitivis ad Carengue (no. **397** pr. p.).

AMBACA.—Ad corticem arboris prope Puricarambola (no. **374** pr. p.).

20. **Gr. foliicola** Wain., sp. n.

Thallus crassitudine mediocris, maculas parvas irregulares formans, nitidiusculus, leviter inæqualis, glaucescenti-albidus, KHO haud distincte reagens, hypothallo indistincto. Apothecia elongata, long. 2 ad 0·7, latit. 0·2 ad 0·15 mm., simplicia aut parce ramosa, vulgo flexuosa curvatave, primum immersa, demum elevata. Perithecium fuligineum, dimidiatum, basi deficiens, labiis conniventibus aut demum anguste hiantibus, tenuiter cæsiopruinosis, lævigatis, latere amphithecio thallino obductis. Discus rimæformis aut passim concavus, nigricans, nudus. Epithecium fuscescenti-rufescens. Sporæ 8næ, 7- ad 9-septatæ, decolores, jodo cærulescentes, long. 0·024 ad 0·032, crass. 0·008 mm., apicibus obtusis. Habitu similis est *Gr. assimili* Nyl.

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GOLUNGO ALTO.—Ad folia arbusti Sapindacei in sylvis montosis densis prope Fonte Capopa, una cum *Gr. phyllocharide* Wain. No. **393** pr. p.

21. **Gr. Afzelii** Ach., Syn. Lich. p. 85; Müll. Arg., Graph. Féean. p. 37; Wain., Etud. Lich. Brés. II. p. 124.

Perithecium fuligineum, dimidiatum, basi deficiens, extus et intus strato albo omnino obductum, labiis conniventibus. Sporæ 8næ, 3-septatæ, decolores, jodo non reagentes. Metaplasma ascorum jodo rubescens.

GOLUNGO ALTO.—Ad corticem arborum prope Trombeta. No. **378**.

22. **Gr. roseotincta** Wain., sp. n.

Thallus crassitudine mediocris, lævigatus, opacus, continuus aut rimosus, pulchre roseus aut passim parce albido-pallescens, KHO lutescens. Apothecia elongata aut partim rotundata, long. 7 ad 0·2 mm., recta aut flexuosa, immarginata, thallo immersa. Discus impressus, 0·25 ad 0·15 mm. latus, cæsiopruinosus. Perithecium tenue, albidum. Sporæ haud visæ.

GOLUNGO ALTO.—Ad corticem truncorum vetustorum *Coffeæ arabicæ* prope Cungulungulo. No. **349**.

23. **Gr. cicatricosa** (Ach.) Wain.

Glyphis cicatricosa Ach., Syn. Lich. p. 107.

Var. **simplicior** Wain., Etud. Lich. Brés. II. p. 127.

GOLUNGO ALTO.—Ad *Spondiadem* prope Trombeta (no. **343**). Ad truncos *Zygiæ* juxta ripas rivuli Quiapoze prope Sange (no. **346**). Ad truncos *Fici* prope Bango-Aquitamba (no. **344** pr. p.). Ad corticem arboris prope Quilombo Quiacatubia (nos. **341**, **380** pr. p.). Ad corticem arboris prope Cungulungulo (no. **342**).

2. HELMINTHOCARPON Fée.

1. **H. Le-Prevostii** Fée, Ess. Crypt. Ecorc. Suppl. p. 156; Wain., Etud. Lich. Brés. II. p. 129.

DANDE.—Ad corticem trunci arboris juxta ripas fluminis Lifune. No. **390**.

3. OPEGRAPHA (Humb.) Wain.

1. **O. (Dictyographa) Angolensis** Wain., sp. n.

Thallus tenuis, albidus, lævigatus, opacus, dispersus aut partim continuus. Apothecia approximata, elevata, long. 1 ad 0·3, latit. 0·3 ad 0·2 mm., elongato-oblonga aut ellipsoidea difformiave, simplicia aut raro furcata. Perithecium fuligineum, dimidiatum, labiis primum conniventibus, demum sæpe hiantibus, lævigatis, nudis aut primum diu latere tenuissime thallodice obducta. Hypothecium pallidum aut dilute fuscescens. Discus rimæformis aut demum dilatatus, niger aut fusco-nigricans, nudus, opacus. Hymenium jodo vinose rubens, haud cærulescens. Epithecium dilute fuscescens aut pallidum aut fere decoloratum. Paraphyses ramoso-connexæ, ramis increbris, apice haud incrassatæ. Asci oblongi, membrana demum parum incrassata, primum æqualiter incrassata. Sporæ 8næ, oblongæ, apicibus rotundatis aut obtusis,

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decolores, murales, septis transversalibus 8 ad 10, loculis apicalibus simplicibus, loculis mediis omnibus aut nonnullis septo longitudinali in cellulas duas divisis, jodo haud reagentes, long. 0·021 ad 0·030, crass. 0·005 ad 0·007 mm. Affinis est *O.* (*Dictyographæ*) *Arabicæ* (Müll. Arg., Lich. Arab. p. 131) et *varianti* (Müll. Arg., Lich. Socot. p. 379).

LOANDA (0 ad 1000 ped. s. m.).—Ad truncos ramosque *Rhizophorarum* in insula Loanda socialis cum *Roccella Montagnei*. No. **351**. Ad ramulos *Balsamodendri* prope Boa Vista una cum *Arthonia gregaria* v. *speciosa*. No. **361**. Ad ramulos *Adansoniæ* prope Praia de Zamba una cum *A. gregaria* v. *speciosa*. No. **369**.

2. **O. (Euopegrapha) prosodea** Ach., Meth. Lich. p. 22; Müll. Arg., Graph. Féean. p. 18.

Corticola in planitie secus flumen Quillu a Pechuel-Loesche lecta, teste Müll. Arg., Lich. Afr. Occ. p. 38.

3. **O. cylindrica** Raddi; Wain, Etud. Lich. Brés. II. p. 132. *O. Bonplandi* Fée, Ess. Crypt. Ecorc. p. 17; Müll. Arg., Graph. Féean. p. 17, Lich. Afr. Occ. p. 38.

LOANGO.—In cortice emortuo Palmarum lecta a Pechuel-Loesche, teste Müll. Arg., Lich. Afr. Occ. p. 38.

4. **O. subvulgata** Nyl., Fl. 1869, p. 71; Wright, Lich. Cub. n. 101 C in herb. meo (haud Cromb., Chall. Exp. p. 226).

Perithecium integrum, fuligineum, labiis conniventibus. Hymenium jodo vinose rubens (haud cærulescens). Sporæ 8næ, decolores, 7-septatæ, loculis sat æqualibus, halone nullo indutæ, long. 0·030 ad 0·038, crass. 0·005 mm.

GOLUNGO ALTO.—Ad truncum fruticis arborescentis *Lophostylidis* (i.e. *Securidaca Welwitschii*) in silvis primitivis in Serra de Alta Queta. No. **323** pr. p.

5. **O. septemseptata** Wain., sp. n.

Thallus tenuis, leviter verruculoso-inæqualis aut sat lævigatus, albido-glaucescens, opacus, continuus aut rimulosus, partim linea nigricante limitatus. Apothecia approximata, elevata, oblonga aut rarius elongato-oblonga ellipsoideave, vulgo recta, long. 1 ad 0·3, latit. 0·25 ad 0·15 mm., simplicia aut raro 3-radiata. Perithecium fuligineum, integrum, labiis lævigatis, conniventibus aut parcius demum hiantibus. Labia nigra, at microscopio visa solum margine dehudata et inferne strato tenuissimo albido obducta. Hypothecium fuligineum, sat crassum. Discus rimæformis aut parcius demum dilatatus, nigricans, nudus. Hymenium jodo vinose rubens, haud cærulescens. Epithecium fuligineum, KHO smaragdulo-fuligineum. Asci oblongi, membrana sat tenui. Paraphyses ramoso-connexæ. Sporæ 8næ, decolores, halone indutæ, 5- ad 7-septatæ, loculis 1 ad 2 mediis reliquis multoties longioribus, long. 0·032 ad 0·043, crass. 0·005 ad 0·006 mm. (cum halone 0·010 mm.). Affinis *O. confusulæ* Müll. Arg., Graph. Féean. p. 17.

GOLUNGO ALTO.—Ad corticem arboris Artocarpeæ Musibiri (i.e. *Myrianthus arboreus*) prope Sange. No. **376** pr. p.

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6. **O. ochracea** Wainio, sp. n.

Thallus tenuis, leviter verruculoso-inæqualis, pruina albido-ochracea, opacus, continuus aut rimulosus, partim linea nigricante limitatus. Apothecia approximata, elevata, elongata aut oblonga aut parce etiam ellipsoidea, long. 2 ad 0·3, latit. 0·25 ad 0·3 mm., leviter flexuosa aut sat recta, simplicia aut raro furcata. Perithecium fuligineum, integrum, labiis hiantibus, ochraceo-pruinosis aut denudatis, lævigatis. Discus dilatatus, ochraceo-pruinosus aut demum plus minusve denudatus. Hypothecium subhymeniale tenue, pallidum. Hymenium et hypothecium subhymeniale jodo persistenter cærulescentia. Epithecium fuscofuligineum. Paraphyses ramoso-connexæ. Sporæ 8næ, decolores, 3-septatæ, long. 0·014, crass. 0·004 mm., halone nullo indutæ.

LOANDA (0 ad 1000 ped. s.m.).—Ad corticem *Cordiæ* prope Boa Vista. No. **370**.

7. **O. albocinerea** Wain., sp. n.

Thallus tenuis, sat lævigatus, albus, opacus, continuus aut partim subdispersus. Apothecia bene approximata, semi-immersa, oblonga aut partim ellipsoidea rotundatave aut difformia, simplicia aut 3-radiata, recta aut curvata flexuosave, long. 0·8 ad 0·2, latit. 0·3 ad 0·2 mm. Perithecium fuligineum, integrum, labiis hiantibus, margine tenui demum denudatis, latere strato thallino obductis. Hypothecium subhymeniale fuscescens. Discus dilatatus, tenuiter cæsio-pruinosus. Hymenium jodo dilutissime cærulescens, dein vinose rubens. Epithecium fuscescens. Paraphyses ramoso-connexæ. Sporæ 8næ, decolores, 3-septatæ, long. 0·018 ad 0·023, crass. 0·003 ad 0·004 mm., halone nullo indutæ. Pycnoconidia filiformi-cylindrica, curvata, long. 0·014 ad 0·012, crass. 0·0007 mm.

LOANDA (0 ad 1000 ped. s. m.).—Ad truncos *Sterculiæ* in collibus prope Boa Vista. No. **382**.

8. **O. subrimulosa** Nyl., Fl. 1866, p. 293, Wright, Lich. Cub. n. 103*b*. (in herb. meo).

Thallus tenuissimus, cinereo-fuscescens. Perithecium fuligineum, integrum, basi crassum. Hymenium jodo vinose rubens, haud cærulescens. Epithecium fuscescens, KHO non reagens. Sporæ 8næ, decolores, 3-septatæ, long. 0·018 ad 0·022, crass. 0·003 ad 0·0035 mm., halone nullo indutæ.

GOLUNGO ALTO.—Ad corticem arboris Artocarpeæ Musubiri (i.e. *Myrianthus arboreus*) prope Alta Queta. No. **375**.

9. **O. (Pleurothecium) prosodeoides** Wain., sp. n.

Thallus tenuis, sat lævigatus, glaucescens aut olivaceo-glaucescenti-variegatus, opacus, continuus, linea nigricante limitatus. Apothecia approximata, elevata, elongata oblongave aut parcius etiam ellipsoidea, recta aut curvata, long. 1 ad 0·3, latit. 0·2 mm., simplicia. Perithecium fuligineum, dimidiatum, basi parte angusta deficiens, labiis lævigatis, conniventibus. Hypothecium pallidum. Discus rimæformis, nigricans, nudus. Hymenium jodo vinose rubens, haud cærulescens. Epithecium decoloratum. Paraphyses

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ramoso-connexæ. Asci membrana tenui. Sporæ 8næ, decolores, fusiformi-aciculares, halone indutæ, 8- ad 13-septatæ, long. 0·030 ad 0·056, crass. 0·006 ad 0·008 mm. (cum halone). Perithecio dimidiato a *O. prosodea* Ach. differt.

GOLUNGO ALTO.—Ad ramulos Artocarpeæ in Golungo Alto. No. **362** pr. p.

10. **O. graphidiza** Nyl., Lich. Ang. p. 12.

Perithecium fuligineum, dimidiatum, basi deficiens. Labia diu conniventia, demum hiantia, strato tenui thallino obducta aut demum superne denudata, elevata. Hymenium jodo intense persistenter cærulescens, ascis vinose rubentibus. Hypothecium pallidum, tenue. Epithecium obscuratum. Sporæ 8næ, decolores aut demum morbose nigricantes, primum halone indutæ, 5- ad 7-septatæ (ad 9-septatæ, observante Nyl., *l.c.*). Paraphyses parce ramoso-connexæ. Discus nigricans nudusque aut raro subpruinosus.

LOANDA (0 ad 1000 ped. s. m.).—Ad truncos vetustos *Euphorbiæ candelabri* inter Camama et Calumbo, una cum *Arthonia Angolensi*. No. **211** pr. p., **461** pr. p.

11. **O. Loandensis** Nyl., Lich. Ang. p. 13.

Apothecia semi-immersa. Perithecium fuligineum, dimidiatum basique deficiens, at hypothecium fuscescens. Labia hiantia, extus primum strato tenui thallino obducta, demum superne denudata, semi-immersa. Discus dilatatus, nigricans nudusque aut demum pruinosus. Hymenium jodo vinose rubens, haud cærulescens aut primum passim dilutissime cærulescens. Epithecium fuscescens. Paraphyses ramoso-connexæ. Sporæ 3- ad 5-septatæ, halone nullo indutæ, decolores.

LOANDA.—Ad truncos vetustos *Euphorbiæ candelabri* in agro Loandensi frequenter cum *Arthonia Angolensi* (0 ad 1000 ped. s. m.). No. **398** pr. p.

CALUMBO.—Ad truncos vetustos *Euphorbiæ candelabri* inter Camama et Calumbo frequenter cum *Arthonia Angolensi*. No. **399** pr. p.

12. **O. (Aulaxina) Africana** Wain.

Thallus tenuissimus, albidus, tenuissime undulatus aut lævigatus, hypothallo nullo distincto. Gonidia globosa, diam. 0·005 ad 0·006 mm., simplicia, at habitu pleurococcoidea, membrana modice incrassata. Apothecia longitudine et latitudine circ. 0·2 mm., angulosa. Perithecium fuligineum, dimidiatum, basi deficiens, labiis conniventibus, tenuissime thallino-vestitis. Discus dilatatus, rotundato-angulosus, fusco-nigricans. Hymenium jodo fulvescens. Epithecium decoloratum. Asci clavati, long. circ. 0·030, crass. 0·016 ad 0·018 mm., membrana tenui. Paraphyses ramoso-connexæ. Sporæ 8næ, decolores, oblongæ, 5- ad 3-septatæ, loculis æqualibus, apicibus rotundatis obtusisve, long. 0·015 ad 0·017, crass. 0·004 ad 0·005 mm.

GOLUNGO ALTO.—Ad folia perennia arborum in sylva prope Sobado Bango Aquitamba. No. **302**. Affinis est *O. velatæ* (Müll. Arg.) Wain. (Müll. Arg., Lich. Beitr. n. 1532), at sporis magis divisis ab ea differens.

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4. **CHIODECTON** (Ach.) Wain.

1. **Ch. amyloplacum** Wain., sp. n.

Thallus sat tenuis aut mediocris, leviter inæqualis, albus, opacus, crebre contextus, hypothallo nigricante crebre contexto partim anguste limitatus. Apothecia crebra approximataque, anguloso-orbicularia aut parce etiam ellipsoidea oblongave, diametro vulgo 0·6 ad 0·3 mm., primum diuque immersa, demum emersa basique constricta, disco cæsio-pruinoso, margine duplice tenui, e perithecio proprio subdenudato nigricanteque et ex amphithecio thallino crebre contexto formata. Perithecium fuligineum, integrum, tenue. Amphithecium tenue, gonidia continens. Hypothecium rufescens, sat crassum. Hymenium jodo vinose rubens (vix cærulescens). Epithecium fuscofuligineum. Paraphyses tenuissimæ, ramoso-connexæ. Sporæ 8næ, bacillares, apicibus obtusis, pluri-loculares, septis 9 aut pluribus, demum fuscescentes (forsan morbose), long. 0·034 ad 0·040, crass. 0·0025 ad 0·004 mm., halone nullo indutæ. Habitu subsimile est *Lecideæ amylaceæ* (Ehrh.) Nyl., Prodr. Lich. Gall. p. 137 (*Lecanactidi illecebrosæ* Hepp, Flecht. Eur. n. 533), et affine forsan est *Lecanactidi stictica* Dur. et Mont. (Nyl., *l.c.*, p. 161).

LOANDA (0 ad 1000 ped s. m.).—Ad corticem *Euphorbiæ candelabri* una cum *Opegrapha graphidiza* et *Arthonia Angolensi*. No. **400** pr. p.

2. **Ch. strigulinum** (Nyl.) Wain., Etud. Lich. Brés. II. p. 147.

Gonidia phycopeltidea. Stylosporæ oblongæ, simplices, decolores, apicibus rotundatis, long. 0·007 ad 0·008, crass. 0·002 mm. Sterigmata simplicia, elongata. Conceptacula pycnidum fuscofuliginea, integra. Apothecia in collectione Welwitschiana haud visa.

GOLUNGO ALTO.—Ad folia perennia arboris prope rivulum Cuango ad basin montis Serra de Alta Queta. No. **313**.

3. **Ch. perplexum** Nyl., Prodr. Nov.-Granat. Addit. p. 342; Müll. Arg., Graph. Féean. p. 67.

Ad ramos arboris Spondiadis prope Chinchoxo in territorio Landana lecta a Pechuel-Loesche, teste Müll. Arg., Lich. Afr. Occ. (Linnæa 1880), p. 40 (*Ch. farinaceum*).

4. **Ch. sanguineum** (Sw.) Wain., Etud. Lich. Brés. II. p. 143.

Corticola in planitie secus flumen Quillu lecta a Pechuel-Loesche, teste Müll. Arg., Lich. Afr. Occ. p. 40 (*Ch. rubrocinctum*).

5. **ARTHONIA** (Ach.) Wain.

1. **A. (Arthothelium) Angolense** (Nyl.) Wain.

Tremotylium Nyl., Lich. Angol. p. 8.

Gonidia chroolepoidea, cellulis circ. 0·010 ad 0·014 mm. crassis. Paraphyses ramoso-connexæ, valde intricatæ, apicibus leviter incrassatis, fuscescentibus. Sporæ murales, septis transversalibus 9 ad 11. Apothecia in pseudostromatibus aggregata, disco ellipsoideo oblongove aut minore parte rotundato, nigricante aut livido, demum denudato. Perithecium laterale evanescens.

LOANDA (0 ad 1000 ped. s. m.).—Ad corticem *Euphorbiæ candelabri*

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in agro Loandensi (nos. **164** pr. p., **212** pr. p., **398** pr. p., **400** pr. p., **461** pr. p.). Ad corticem *Adansoniæ* (no. **200**), et *Euphorbiæ candelabri* (no. **328** pr. p.) prope Boa Vista. Ad corticem *Euphorbiæ candelabri* frequenter inter Camama et Calumbo (nos. **211** pr. p., **399** pr. p.). Ad frutices inter Dande et Bengo (no. **449** pr. p.). Ad corticem *Adansoniæ* in maritimis prope Samba (no. **209**) frequenter.

2. **A. lacerata** Wain., sp. n.

Thallus sat tenuis, dispersus laceratusque, quasi lacinias angustissimas elongatas irregularesve formans, glaucescens, opacus, gonidia chroolepoidea (cellulis circ. 0·008 mm.) continens. Apothecia solitaria, rotundato-difformia, 0·6 ad 0·2 mm. lata, verrucis leviter elevatis inclusa, disco carneo-pallido, tenuiter pruinoso. Hymenium jodo persistenter cærulescens. Paraphyses ramoso-connexæ. Asci pyriformes, long. circ. 0·050, crass. circ. 0·034 mm. Sporæ 4næ (aut forsan etiam 8næ), decolores, demum murales, septis transversalibus 5 ad 7, cellulis sa numerosis, long. 0·020 ad 0·028, crass. 0·008 ad 0·012 mm.

BARRA DO BENGO.—Supra folia Citri ad Convento S. Antonio prop flumen Bengo. No. **317** pr. p.

3. **A. distenta** Wain., sp. n.

Thallus crassitudine mediocris, leviter inæqualis aut sat lævigatus, rimosus, leviter nitidus, glaucescens, hypothallo indistincto. Apothecia sat approximata, irregulariter oblonga ellipsoideave aut rotundata difformiave, long. 1·1 ad 0·4, latit. 0·6 ad 0·4 mm., leviter emergentia, disco fusco-nigro, primum pelliculis parce tecta, dein mox denudata. Hypothecium albidum. Hymenium jodo persistenter cærulescens. Epithecium rufescens. Asci ellipsoidei aut ellipsoideo-obovoidei, long. circ. 0·075, crass. 0·055 mm. Sporæ 8næ aut pauciores, nigricantes, oblongæ, medio leviter constrictæ, murales, septis transversalibus circ. 12, long. 0·058 ad 0·078, crass. 0·010 ad 0·011 mm., halone nullo indutæ. Ab *A. cyrtode* Tuck. et *A. distendente* Nyl. colore hypothecii et sporarum et apotheciis difformibus differt.

BARRA DO BENGO.—Ad truncos emortuos arboris Mafumeira (i.e. *Ceiba Casearia*) prope S. Antonio do Bengo. No. **354**.

4. **A. homœophana** Nyl., Prodr. Fl. Nov.-Granat. ed. 2, p. 236; Syn. Lich. Nov. Caled. p. 65; Willey, Syn. Arth. p. 51.

Thallus sat tenuis, sat lævigatus, continuus aut leviter rimosus, albido-glaucescens, leviter nitidus. Apothecia partim sat approximata, difformia, long. 1·3 ad 0·5, latit. 0·8 ad 0·4 mm., parum emergentia, disco fusco-nigro, primum pelliculis parce tecto, dein denudato. Hypothecium pallidum. Hymenium jodo vinose rubens aut passim primum levissime cærulescens. Epithecium rufescens vel rubescenti-rufescens, KHO olivaceum. Asci subglobosi, diam. circ. 0·100 ad 0·066 mm. Sporæ 8næ (ut videtur), obscuratæ, murales, septis transversalibus 5 vel pluribus, long. 0·036 ad 0·060, crass. 0·014 ad 0·022 mm. Vix nisi sporis obscuratis ab *A. macrotheca* Fée differt.

DANDE.—Ad *Rhizophoras* juxta ostia fluminis Lifune. No. **353**.

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5. **A. Loandensis** Wain., sp. n.

Thallus tenuis, virescens, sat lævigatus, continuus aut leviter rimosus, parum nitidus. Apothecia dispersa, difformia, partim subastroidea, long. 1·2 ad 0·3, latit. 0·7 ad 0·2 mm., haud emergentia, disco nigro, denudato. Hypothecium pallidum. Hymenium jodo vinose rubens (haud cærulescens). Epithecium pallido-fuscescens, KHO olivaceum. Asci subglobosi. Sporæ 8næ, ovoideo-oblongæ, demum nigricantes, murales, cellulis paucis, septis transversalibus 7, loculo apicali crassiore reliquis multo longiore, strato gelatinoso indutæ, long. circ. 0·035, crass. 0·014 mm.

LOANDA (0 ad 1000 ped. s. m.).—Ad corticem fruticis prope Teba. No. **465**. Gonidia chroolepoidea, parva.

6. **A. (Euarthonia) platygraphidea** Nyl., Lich. Nov.-Gran. ed. 2, p. 235; Müll. Arg., Graph. Féean. p. 59; Wain., Etud. Lich. Brés. II. p. 151, Lich. Brés. Exs. n. 90.

Apothecia partim suborbicularia, elevata. Hypothecium dilute fuscescens vel pallidum. Epithecium fuscescens. Hymenium jodo intense persistenter cærulescens. Asci ellipsoideo-obovoidei, apicem versus membrana incrassata, long. circ. 0·070, crass. 0·050 mm. Paraphyses ramoso-connexæ. Sporæ 8næ, decolores, fusiformi-oblongæ, 10- vel 11-septatæ, cellulis 2 mediis reliquis paullo longioribus, long. 0·055 ad 0·065, crass. 0·016 mm. (no. 460).

BARRA DO BENGO.—Ad ramulos fruticum prope S. Antonio de Bengo juxta latera viæ ex Quifandongo. No. **460**.

HUILLA.—Ad ramulos arborum in editioribus (3800 ad 5500 ped. s. m.) montis Serra de Lopollo. No. **462** pr. p.

7. **A. leptogramma** Müll. Arg., Lich. Afr. Occ. p. 39.

Ad corticem emortuum Palmarum secus flumen Quillu lecta a Pechuel-Loesche teste Müll. Arg., *l.c.*

8. **A. platyspilea** Nyl., Lich. Nov.-Gran. ed. 2, p. 230; Willey, Syn. Arth. p. 16.

Hypothecium pallidum, jodo cærulescens. Hymenium jodo persistenter cærulescens, membrana ascorum haud reagens aut levissime violascens, metaplasma rubescens. Epithecium sordide pallidum aut fuscescens. Asci subglobosi aut obovoidei, long. 0·032 ad 0·046, crass. 0·024 ad 0·030 mm. Sporæ 8næ, fusiformi-oblongæ, apicibus obtusis, decolores, cellulis 2 mediis paullo longioribus aut sat æqualibus, long. 0·019 ad 0·030, 0·006 ad 0·008 mm., 5—7-septatæ. Gonidia chroolepoidea, cellulis circ. 0·006—0·008 mm. crassis.

AMBRIZ.—Ad corticem fruticis in fuga ex Mossul ad Barra do Dande lectum. No. **239**.

LOANDA (0 ad 1000 ped. s. m.).—Ad *Adansoniam* (no. **453**) et *Rhizophoram* (no. **337**). Ad corticem *Euphorbiæ candelabri* in collinis maritimis (no. **320**) et ad ramulos fruticum *Cordiæ*, *Balsamodendri*, Rubiacearum et Verbenacearum in collinis prope Boa Vista (no. **334**).

9. **A. Loangana** Müll. Arg., Lich. Afr. Occ. p. 38.

A. Loandana Müll. Arg., Lich. Montev. p. 5 (errat.).

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Palmicola secus flumen Quillu lecta a Pechuel-Loesche, teste Müll. Arg., *l.c.*

10. **A. gregaria** (Weig.) Kœrb.

Var. **tumidula** (Ach.) Almqu., Mon. Arth. Scand. p. 163; Wain., Etud. Lich. Brés. II. p. 163.

Thallus albidus aut cinerascens. Apothecia anguloso-rotundata, disco cæsio-pruinoso, margine coccineo.

AMBACA.—Ad truncos *Nathusiæ* prope Puri-Cacarambola. No. **330** pr. p.

GOLUNGO ALTO.—Ad corticem arboris Euphorbiaceæ in sylvis editis (2200 ped. s. m.) in Sovado de Quilombo. No. **321**. Non infrequens ad truncos *Lophostylidis* (i.e. *Securidaca Welwitschii*) in sylvis primitivis ad Alta Queta. No. **323** pr. p. (**255** pr. p.). Ad corticem *Acaciæ* prope Camilungo. No. **338** pr. p.

Var. **adspersa** (Mont.) Wain., *l.c. Leiogramma tenellum* Eschw. in Mart. Fl. Bras. (1833), p. 101, teste Müll. Arg., Fl. 1888, p. 524 (at disco nigro describitur). *A. gregaria* v. *pruinata* Del. in Nyl., Prodr. Lich. Gall. p. 164.

Thallus albidus aut cinerascens. Apothecia anguloso-rotundata, disco crebrius aut tenuius albido- vel cæsio-pruinoso, margine albido- vel cæsio-pruinoso.

GOLUNGO ALTO.—Ad Spondiaceas prope Sange (no. **329** pr. p.) et Trombeta (no. **333**). Ad truncos vetustos *Acaciæ* prope Camilungo (no. **338** pr. p.). Ad corticem *Dracænæ* prope Carengue (no. **324** pr. p.). Ad truncos arboris Artocarpeæ in sylvis primævis in Serra de Alta Queta (no. **331**). Ad truncos prope Cacarambola (no. **452**).

Var. **kermesina** (Schær.) Nyl., Lich. Scand. p. 257; Willey, Syn. Arth. p. 7.

Thallus plus minusve coccineo-pruinosus. Apothecia anguloso-rotundata aut partim oblonga, disco cæsio-pruinoso, margine coccineo-pruinoso. Hymenium jodo intense persistenter cærulescens. Asci pyriformes. Sporæ decolores, 4- vel 5-septatæ, long. 0·014, crass. 0·0045 ad 0·009 mm.

LOANDA (0 ad 1000 ped. s. m.).—Ad corticem *Euphorbiæ candelabri* prope Boa Vista. No. **328** pr. p. Transit in var. *speciosam*, quacum crescit.

Var. **speciosa** Müll. Arg., Lich. Usambar. (1894), p. 286.

Thallus plus minusve coccineo-pruinosus. Apothecia partim elongata, simplicia aut parce ramosa, disco primum coccineo-pruinoso, dein denudato nigricanteque, margine coccineo-pruinoso. Hymenium jodo cærulescens, dein vinose rubens. Sporæ 8næ, sæpe demum nigricantes, 2—4-septatæ, long. 0·013 ad 0·016, crass. 0·005 ad 0·006 mm.

LOANDA (0 ad 1000 ped. s. m.).—Ad ramulos *Sterculiæ* in collinis sabulosis agri Loandensis. No. **332**. Ad ramos *Adansoniæ* in nemore maritimo prope Samba. No. **325**. Ad truncos *Adansoniæ* prope Represa do Manoel Pereira. No. **327** pr. p. Ad corticem *Adansoniæ* (no. **326**), *Euphorbiæ candelabri* (no. **328** pr. p.), *Balsamodendri* (nos. **361** pr. p., **336** pr. p.) prope Boa Vista. Ad corticem *Adansoniæ* prope Praia de Zamba. No. **369** pr. p.

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Var. **reducta** Wain.

Thallus albidus aut passim dilute roseus. Apothecia elongata, angusta, circ. 0·1 ad 0·15 mm. lata, substellato-ramosa aut partim simplicia, disco denudato nigricanteque, margine coccineo-pruinoso. Hymenium jodo vinose rubens. Asci pyriformes, long. circ. 0·046, latit. 0·028 mm. Sporæ decolores, vulgo 3-septatæ, parce 4-septatæ, long. 0·016 ad 0·020, crass. 0·003 ad 0·006 mm.

BARRA DO BENGO.—Ad ramulos semiherbaceos inter S. Antonio de Bengo et Quifandongo. No. **322**.

Var. **rimata** Wain.

Thallus plus minusve coccineo-pruinosus. Apothecia oblonga, opegraphoidea, margine elevato, nigricante, denudato, disco impresso, dilatato-rimæformi, nigricante, denudato. Hymenium jodo persistenter cærulescens. Asci pyriformes. Sporæ 8næ, decolores, ovoideo-oblongæ, vulgo 5-septatæ, parce 6-septatæ, cellulis 2 mediis quam reliquis paullo longioribus aut cellulis æqualibus, long. 0·017 ad 0·022, crass. 0·005 ad 0·006 mm.

BENGUELLA.—Ad ramulos *Acaciæ etbaicæ* in sylvestribus non procul ab oceano prope Benguella. No. **3**.

Var. **medusæformis** Wain.

Thallus albidus. Apothecia elongata, crebre et abundanter radiato-ramosa, disco plano fuscescente, tenuissime griseo-fuscescenti-pruinosa, margine indistincto, passim maculis dilute roseis circumdata. Hymenium jodo persistenter cærulescens, ascis violascentibus. Sporæ 8næ, 3—4-septatæ, cellula apicali quam reliquis duplo longiore, long. 0·016 ad 0·018, crass. 0·005 ad 0·007 mm. Epithecium intense coccineum. Hypothecium dilutius coccineum.

LOANDA (0 ad 1000 ped. s. m.). Ad truncos *Adansoniæ digitatæ* prope Repreſa do Manoel Pereira. No. **327** pr. p.

Var. **obscura** Schær.; Koerb., Syst. Germ. p. 291. *Coniocarpon gregarium β obscurum* Schær., Lich. Helv. Exs. n. 649; Mass., Symm. Animadv. (1853), p. 13; Hepp, Flecht. Eur. n. 163.

Thallus vulgo livido-cinerascens. Apothecia nigra, difformia, brevia, nuda.

GOLUNGO ALTO.—Ad corticem *Entandrophragmatis angolensis* prope Sange. No. **469**. Perithecium laterale (sub microscopio visum) coccineum. Asci clavati, latit. circ. 0·022 mm. Sporæ decolores aut dilute fuscescentes, long. 0·024 ad 0·026, crass. 0·009 ad 0·010 mm., 4—5-septatæ.

11. **A. rubella** (Fée) Nyl., Syn. Arth. p. 89; Müll. Arg., Graph. Féean. p. 56; Willey, Syn. Arth. p. 11.

Hymenium jodo persistenter cærulescens, ascis pr. p. dilute violascentibus. Epithecium sordide subrubescens. Hypothecium pallidum. Asci ellipsoideo-obovoidei, long. circ. 0·050, crass. 0·040 mm. Sporæ 8næ, decolores aut demum dilute nigricantes, 3—5-septatæ, cellula apicali quam reliquis duplo longiore, long. 0·026 ad 0·033, crass. 0·011 ad 0·012 mm.

AMBRIZ.—Ad truncum *Elæidis guineensis*. No. **360** pr. p.

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NÆVIA Fr.

Hoc genus, defectu gonidiorum ab *Arthonia* differens, ad fungos pertinet.

1. **N. euphorbiæ** Wain., sp. n.

Thallus macula cinereo-albida indicatus, linea nigricante partim limitatus, gonidiis carens. Apothecia sat dispersa, difformia, long. et latit. circ. 0·7 ad 0·2 mm., demum sæpe centro emorientia, parum emergentia, disco nigro, nudo, planiusculo. Hypothecium albidum. Hymenium jodo non reagens, membrana ascorum levissime rosea, metaplasma rubescens. Paraphyses ramoso-connexæ, apicem versum sensim incrassatæ smaragdulæque. Epithecium olivaceo-smaragdulum, KHO non reagens. Asci subglobosi, long. 0·030 ad 0·032, crass. 0·026 mm., apice membrana incrassata. Sporæ 8næ, decolores, ovoideo-oblongæ, 4-septatæ aut parcius etiam 3-septatæ, cellulis æqualibus, long. 0·010 ad 0·015, crass. 0·004 ad 0·005 mm., halone nullo.

LOANDA (0 ad 1000 ped. s. m.).—Ad truncos vigentes *Euphorbiæ candelabri* prope Boa Vista. No. **350** pr. p.

2. **N. parallela** Wain., sp. n.

Thallus macula albida indicatus, gonidiis carens. Apothecia inter fibras ligni erumpentia, elongata, long. 1 ad 0·3, latit. 0·1 mm., recta, parallela, disco nigricante, nudo. Hypothecium pallidum. Hymenium jodo violascens. Epithecium olivaceo-smaragdulum aut sordide smaragdulum. Paraphyses ramoso-connexæ. Asci primum obovoidei, demum ellipsoidei, long. circ. 0·032, crass. 0·016 mm., apice membrana incrassata. Sporæ 8næ, decolores, ovoideæ aut ovoideo-oblongæ, 3-septatæ, cellula latiore apicali quam reliquis paullo longiore, aut cellulis sat æqualibus, long. 0·011 ad 0·014, crass. 0·005 mm., halone nullo. Cum *A. stictoide* (Desm.) et *A. xylographica* Nyl. comparabilis. Habitu vix differt a *Xylographa parallela*.

BENGO.—Ad lignum vetustum in ramo fruticis inter Dande et Bengo, una cum *A. Angolensi*. No. **449** pr. p.

3. **N. rotundata** Wain., sp. n.

Thallus parum distinctus, gonidiis destitutus. Apothecia e substrato leviter emergentia, rotundata (diam. 0·25 ad 0·2 mm.) aut parcius ellipsoidea (long. 0·4, latit. 0·2 mm.), disco nigricante nudo planiusculo aut leviter convexo. Hypothecium pallidum. Hymenium circ. 0·050 mm. crassum, jodo leviter cærulescens, dein vinose rubens. Epithecium smaragdulo-fuligineum, KHO non reagens. Paraphyses parce apice ramoso-connexæ. Asci clavati, long. circ. 0·040, crass. 0·014 mm., apice membrana incrassata. Sporæ 8næ, decolores, distichæ, ovoideo-fusiformes aut oblongæ, 3-septatæ, loculis æqualibus, long. 0·011 ad 0·012, crass. 0·003 ad 0·004 mm. Excipulum basi pallidum, latere smaragdulo-fuligineum, KHO non reagens, circ. 0·040 mm. crassum. *Arthonia mediella* ab hac specie epithecio et hypothecio fuscescente differt et *N. punctiformis* ascis latioribus et reactione hymenii ab ea recedit.

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MOSSAMEDES (0 ad 1000 ped. s. m.).—Ad caules *Zygophylli orbiculati* Welw. prope Mossamedes. No. **423**.

4. **N. Benguellensis** Wain., sp. n.

Thallus parum distinctus, circa apothecia ex hyphis nigricantibus formatus, gonidiis destitutus. Apothecia sat dispersa, irregulariter ellipsoidea, long. 1·3 ad 0·7, latit. 0·7 ad 0·3 mm., emergentia, disco nigro, nudo, leviter convexo. Hypothecium et epithecium et lamina tota apothecii olivaceo-smaragdula. Hymenium jodo persistenter cærulescens. Asci clavati, long. circ. 0·030, crass. 0·010 mm., parte superiore præsertimque apicem versus membrana incrassata. Sporæ 8næ, distichæ, decolores, ovoideo-oblongæ, long. 0·009 ad 0·012, crass. 0·003 mm., 2-septatæ.

BENGUELLA.—Ad lignum sepium in ipsa urbe Benguella. No. **20**.

II. PYRENOLICHENES.

1. **ENDOCARPON** Hedw.

1. **E. pusillum** Hedw., Descr. Musc. ii. fasc. 2 (1788), p. 56.

Dermatocarpon Arn., Lich. Jur. p. 239, Lich. Tirol xxx. p. 34. *Verrucaria Garovaglii* (Mont.) Nyl., Lich. Angol. p. 14. *Thelotrema Schæreri* Hepp, Flecht. Eur. n. 100.

GOLUNGO ALTO.—Ad terram arenosam juxta margines sylvæ in monte Cungulungulo (2500 ped. s. m.) plagas latas obtegens sat frequenter obvenit. No. **55**.

Specimina determinabilia non vidi.

2. **THELENELLA** (Nyl.) Wain.

1. **Th.** (subg. **Meristosporum** sect. *Phlœobathelium*) **purpurina** (Leight.) Wain.

Trypethelium purpurinum Leight., Lich. Amaz. p. 459. *Bathelium* Müll. Arg., Lich. Afr. Occ. p. 45.

Corticola secus flumen Quillu leg. Pechuel-Loesche, teste Müll. Arg., *l.c.*

2. **Th.** (subgen. **Euthelenella** sect. *Microglœna*) **fulva** Wain., sp. n.

Thallus sat tenuis aut mediocris, pulchre fulvescens, continuus, sat lævigatus aut verrucoso-inæqualis, nitidiusculus, hypothallo parum distincto. Apothecia verrucas 1·5 ad 1 mm. latas, mammæformes, basi haud constrictas, strato thallino thallo concolore late obductas, vertice 0·4 ad 0·6 mm. lato denudato, nigricante aut primum cinerascente, umbonato aut demum applanato instructas formantia, solitaria aut rarius parce confluentia. Perithecium globosum, fuligineum, integrum. Nucleus jodo non reagens, gonidia hymenialia non continens. Paraphyses increbre ramoso-connexæ. Sporæ 4næ, decolores, oblongæ, apicibus rotundatis, murales, cellulis numerosissimis, halone indutæ, long. circ. 0·190 ad 0·220, crass. 0·030 mm. Gonidia chroolepoidea. Stratum corticale thalli amorphum, bene evolutum.

GOLUNGO ALTO.—Ad *Citrum Medicam* silvestrem prope Mata Quisuculo. No. **230**.

Affinis sit *Th. duplicascenti* (Nyl.) Wain. (Nyl., Lich. Andam. p. 19).

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3. **PARMENTARIA** Fée.

1. **P. astroidea** Fée, Ess. Crypt. Ecorc. (1824), p. 70, Müll. Arg., Pyr. Féean. p. 7.

Pyrenastrum Americanum Spreng., Linn. Syst. Veg. iv. (1827), p. 248; Stizenb., Lich. Afr. p. 232. *Heufleria pentagastrica* Müll. Arg., Lich. Afr. Occ. p. 45 (Lich. Beitr. n. 592, 826).

Ad corticem arborum prope flumen Quillu leg. Pechuel-Loesche.

4. **BOTTARIA** (Mass.) Wain.

1. **B.** (subg. **Anthracothecium**) **epapillata** (Nyl.) Wain.

Verrucaria Nyl., Exp. Pyrenocarp. p. 43, Prodr. Fl. Nov.-Granat. Addit. p. 344.

GOLUNGO ALTO.—Ad corticem *Adansoniæ* (no. **231**) et Spondiacearum (no. **329**) prope Sange. Ad corticem *Entandrophragmatis angolensis* (no. **250**).

Thallus pallidus. Apothecia verrucas 1 ad 1·2 mm. latas stratothallino crasso aut tenui obductas, vertice interdum demum denudatas, æqualiter convexas, bene elevatas aut depresso-hemisphæricas formantia. Perithecium globosum, integrum, fuligineum, columella nulla. Sporæ binæ, murales, fuscescentes, strato gelatinoso indutæ, long. 0·120 ad 0·185, crass. 0·030 ad 0·048 mm., oblongæ, apicibus rotundatis. Paraphyses maxima parte simplices, parcissime etiam ramoso-connexæ.

2. **B.** (**Anthracothecium**) **thelomorpha** (Tuck.) Wain.

Pyrenula Tuck., Gen. Lich. p. 275, Syn. North Am. Lich. ii. p. 141.

Thallus albidus aut raro partim flavido-pallescens (in no. 462), tenuis, endophlœodes. Apothecia verrucas diu depresso-hemisphæricas, demum elevatas, 0·4 ad 0·5 mm. latas, diu fere totas strato thallino, thallo concolore, obductas, demum plus minusve late apice denudatas nigricantesque, vertice convexo aut rarius conoideo instructas formantia. Perithecium fuligineum, basi tenue aut deficiens, latere haud dilatata, subglobose bene depressum vel fere hemisphæricum. Paraphyses simplices aut ad latera parce ramosæ. Sporæ 8næ, ellipsoideæ, nigricantes, murales, septis transversalibus 3 ad 5, long. 0·022 ad 0·028, crass. 0·009 ad 0·012 mm. Nucleus jodo non reagens.

AMBRIZ.—Ad corticem Spondiacearum prope Ambriz. No. **65** pr. p.

LOANDA (0 ad 1000 ped. s. m.).—Ad corticem *Balsamodendri* prope Maianga do Povo. No. **103** pr. p. Ad corticem Spondiacearum in Praia de Zamba Grande. Nos. **233** pr. p., **234**.

HUILLA (3800 ad 5500 ped. s. m.).—Ad ramulos arborum in monte Serra de Lopollo. No. **462**.

5. **PYRENULA** (Fée) Wain.

1. **P.** (subg. **Melanotheca**) **Achariana** (Fée) Wain.

Melanotheca Fée, Ess. Crypt. Ecorc. Suppl. p. 41; Müll. Arg., Pyr. Cub. p. 396, Pyr. Féean. p. 18. *Trypethelium anomalum* Ach., Syn. Lich. p. 105 pr. p. (conf. Müll. Arg., Lich. Beitr. n. 845); Hue, Nyl. Lich. Exot., p. 299.

GOLUNGO ALTO.—Ad corticem arboris. No. **248** pr. p. Ad corticem Euphorbiacearum in regione sylvatica edita ad Sovado de Quilombo.

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No. **187**. Ad corticem *Entandrophragmatis angolensis* in sylvis primitivis prope Sange. No. **205**. Ad corticem *Zanthoxyli* in monte Alta Queta. No. **339** pr. p.

Sporæ 8næ, 3-septatæ, nigricantes, long. 0·017 ad 0·019, crass. 0·0055 ad 0·008 mm., loculis lenticularibus. Paraphyses simplices. Perithecium basi deficiens (in no. **187**), cavitate depresse conoideo-subglobosa aut fere hemisphærica. No. **205** ad var. *Angolensem* Wain. pertinet, pseudostromatibus tenuioribus et ostiolo minore, haud pallide annulato dignotam. Incertum est, anne cum *P. Achariana* confluit.

2. **P.** (subg. **Eupyrenula** sect. **Dimidiata**) **conica** Müll. Arg., Lich. Afr. Occ., p. 43.

Ad corticem arboris prope flumen Quillu leg. Soyaux, teste Müll. Arg., *l.c.*

3. **P. fuscolurida** Wain., sp. n.

Thallus endophlœodes, macula fuscescente vel partim testaceo-fuscescente indicatus, lævigatus, hypothallo nigricante limitatus. Apothecia verrucas 0·5 ad 0·8 mm. latas, depresso-hemisphæricas, nigras vel fusco-nigras, subnudas, opacas, vertice convexas aut demum umbonatas formantia. Perithecium fuligineum, basi deficiens, hemisphæricum, latere anguste alato-dilatatum. Sporæ 8næ, oblique monostichæ, 3-septatæ, loculis sat æqualibus, fuscescentes, long. 0·014 ad 0·017, crass. 0·006 ad 0·007 mm., apicibus obtusis.

Sierra Leone.—Ad corticem arboris "Hog-Plum" (i.e. *Spondias Mombin* L.), prope Freetown cultæ. No. **247** pr. p.

4. **P. parva** Wain., sp. n.

Thallus endophlœodes, macula albida aut albido-pallescente indicatus, lævigatus, hypothallo nigricante limitatus. Apothecia verrucas 0·2 ad 0·25 mm. latas, depresso-hemisphæricas aut hemisphæricas, nigras, opacas, strato thallino tenuissimo amorpho pellucido obductas, vertice convexas formantia. Perithecium fuligineum, dimidiatum, basi deficiens, haud alatum. Sporæ 8næ, distichæ, 3-septatæ, loculis sat æqualibus aut apicalibus difformibus, pallidæ aut demum etiam obscuratæ, long. 0·014 ad 0·016, crass. 0·005 ad 0·006, apicibus obtusis.

Sierra Leone.—Ad corticem arboris "Hog-Plum," prope Freetown cultæ, cum specie præcedente. No. **247** pr. p.

5. **P.** (sect. **Pyramidalis**) **eucalypta** Wain., sp. n.

Thallus tenuis, pallidus, lævigatus, hypothallo indistincto. Apothecia verrucas 0·7 (ad 0·5) mm. latas, hemisphæricas aut depresso-hemisphæricas, nigras, strato thallino tenuissimo amorpho pellucido obductas, vertice convexas aut rarius leviter umbonatas formantia. Perithecium fuligineum, compressum, basi tenui leviter convexum, latere anguste alato-dilatatum. Sporæ 8næ aut abortu pauciores, fuscescentes, 3-septatæ, long. 0·030 ad 0·036, crass. 0·014 ad 0·016 mm., apicibus obtusis, loculi apicales intermediis paullo minores.

Golungo Alto.—Ad corticem *Fici* (Quibebe—i.e. *F. Quibeba* Welw.) prope Luinha. No. **213** pr. p.

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5. **P. Trombetana** Wain., sp. n.

Thallus endophlœodes, griseo-pallescens, lævigatus, hypothallo indistincto. Apothecia verrucas 0·6 ad 0·5 mm. latas, hemisphæricas, nigras, basin versus strato thallino tenui subpellucido obductas, vertice convexas aut pro parte leviter umbonatas formantia. Perithecium fuligineum, compressum, basi tenui leviter convexum, latere acutatum, at haud alatum. Nucleus lateribus rotundato-obtusis. Sporæ 8næ, distichæ, fuscescentes, 3-septatæ, long. 0·036 (ad 0·025), crass. 0·015 (ad 0·011) mm., apicibus obtusis, loculi apicales intermediis paullo minores.

GOLUNGO ALTO (1000 ad 2000 ped. s. m.).—Ad corticem Leguminosarum prope Trombeta. No. **124**.

7. **P.** (sect. **Subglobosa**) **acaciæ** Wain., sp. n.

Thallus tenuis, albido-pallescens, parum distincte gibberosus vel verruculis minutissimis sparsis instructus, hypothallo indistincto. Apothecia verrucas 1 ad 0·7 mm. latas, hemisphæricas, cinereo-nigricantes, strato thallino tenui, leviter pellucido aut rarius impellucido obductas aut raro apice leviter denudatas, vertice convexas formantia. Perithecium fuligineum, subglobosum, integrum. Sporæ 8næ aut abortu pauciores, distichæ, fuscescentes, 3-septatæ, long. 0·036 ad 0·042, crass. 0·016 ad 0·018 mm., apicibus obtusis, loculi apicales intermediis paullo minores.

GOLUNGO ALTO.—Ad corticem *Acaciæ* in sylvis prope Mussangue. No. **236**.

8. **P. oculifera** Wain., sp. n.

Thallus sat tenuis, pallidus, sat lævigatus, hypothallo nullo distincto. Apothecia verrucas 0·7 ad 0·9 mm. latas, hemisphæricus, strato thallino, thallo concolore, crassiusculo, circa verticem cinereo-nigricantem abrupte limitato majore parte inferiore vestitas, vertice strato thallino tenuissimo subpellucido obducto 0·4 ad 0·3 mm. lato sæpe leviter impresso et ostiolo leviter umbonato instructas formantia. Perithecium fuligineum, subglobosum, basi tenue. Sporæ 8næ aut abortu pauciores, 3-septatæ, fuscescentes, long. 0·030 ad 0·038, crass. 0·012 ad 0·015 mm., loculi apicales intermediis minores.

AMBACA.—Ad corticem arbusculi prope Puri-cacarambola. No. **237**.

9. **P. gibberosa** Wain., sp. n.

Thallus crassitudine mediocris, fulvescenti-pallidus, continuus, bene gibberosus sive verruculis minutis (circ. 0·1 ad 0·3 mm. latis) irregulariter depresso-hemisphæricis thallo paullo pallidioribus sat crebre instructus, hypothallo parum distincto. Apothecia thallo immersa et solum ostiolo obscurato haud aut parum umbonato-elevato indicata, demum verrucas leviter elevatas, strato thallino thallo consimili circa verticem fusconigricantem denudatum 0·4 mm. latum convexum distincte limitato parte inferiore obductas formantia. Perithecium fuligineum, depresso-subglobosum, 0·7 ad 0·8 mm. latum, basi tenue. Sporæ 8næ, monostichæ (aut spora una distiche disposita), 3-septatæ, fusce-

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scentes, long. 0·022 ad 0·034, crass. 0·011 ad 0·014 mm., apicibus obtusis, loculi apicales intermediis minores.

GOLUNGO ALTO.—Ad corticem *Fici* (Quibebe). No. **252** pr. p. Ad corticem arboris in summo monte Cungulungulo. No. **254**. Ad corticem arborum in sylvis primitivis prope Sange. No. **458** pr. p.

10. **P. euphorbiæ** Wain., sp. n.

Thallus tenuis, olivaceo-pallidus vel isabellinus, minutissime gibberosus sive verruculis punctiformibus (circ. 0·05 mm. latis), solum lente visibilibus, thallo pallidioribus sat crebre instructus, hypothallo nigro parce angusteque limitatus. Apothecia thallo immersa, demum macula olivaceo-nigricante indicata, apice demum vix emergente strato thallino semipellucido obducto instructa. Perithecium fuligineum, integrum, subglobosum, 0·015 ad 0·3 mm. latum. Sporæ 8næ, distichæ, 3-septatæ, fuscescentes, long. 0·017 ad 0·024, crass. 0·009 ad 0·010 mm., apicibus obtusis, loculis sat æqualibus aut apicalibus minoribus.

AMBRIZ.—Ad truncos emortuos *Euphorbiæ* in sylvis primævis inter Ambriz et Quizembo. No. **223**.

6. **ASTROTHELIUM** (Eschw.) Trev.

1. **A. isabellinum** Wain., sp. n.

Thallus sat tenuis aut mediocris, isabellino-pallescens, lævigatus, KHO leviter fulvescens, hypothallo indistincto. Apothecia thallo substratoque immersa, vertice circ. 0·5 ad 0·3 mm. lato denudato nigricante convexa et leviter emergentia, circulos circ. 2 mm. latos ex 8 vel paucioribus peritheciis aggregatis vel leviter confluentibus circa ostiolum commune strato thallino circumdatum formantia. Perithecium fuligineum, hemisphæricum, basi tenue applanatumque. Nucleus jodo cærulescens et demum vinose rubens. Paraphyses neque ramosæ, nec connexæ, gelatinam abundantem percurrentes. Sporæ 8næ, oblique monostichæ, decolores, 3-septatæ, apicibus obtusis, long. 0·010 ad 0·015, crass. 0·005 ad 0·006 mm., loculi lenticulares sat æquales aut apicales intermediis paullo minores.

GOLUNGO ALTO.—Ad corticem arbusculi *Cynometræ laxifloræ* in monte Serra de Alta Queta. No. **193**.

7. **PSEUDOPYRENULA** (Müll. Arg.) Wain.

1. **Ps. (Trypethelium) eluteriæ** (Spreng.) Wain., Etud. Lich. Brés. II. p. 204.

Trypethelium Sprengelii Ach., Lich. Univ. p. 306.

GOLUNGO ALTO.—Ad truncos arborum in sylvis primitivis. No. **188**. Ad corticem *Spondiadis* (no. **196**), *Zanthoxyli* (no. **202**), *Sponiæ* (*Celtis Soyauxi*) (nos. **203**, **204**) in sylvis prope Sange. Ad truncos *Milletiæ* prope Trombeta. Nos. **201***b*, **205***b*, **206** pr. p. Ad truncos arborum in sylvis ad Cungulungulo. Nos. **198**, **342** pr. p.

LOANDA (0 ad 1000 ped. s. m.).—Ad corticem *Spondiadis* prope Baia de Zamba Grande. No. **197**. Sat frequenter ad corticem arborum et fruticum in collibus littoralibus prope Alto da Boa Vista. Nos. **194** pr. p., **222** pr. p. Non infrequens ad ramulos fruticum inter Teba et Cacuaco. No. **195** pr. p.

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LIBONGO.—Ad corticem *Rhizophoræ* prope flumen Lifune. No. **367**.
DANDE.—Ad truncos arborum juxta ripas fluminis Lifune. No. **199** pr. p.

Conceptacula pycnoconidiorum verruculas hemisphæricas 0·2 ad 0·15 mm. latas, crebre aggregatas, parce etiam confluentes, obscure cinerascentes, parcius etiam fulvescenti-maculatas, apice demum nigricantes, materiam fulvam continentes formantia. Pycnoconidia recta, apicibus ambobus clavato-incrassatis rotundatis guttulam oleosam sæpe continentibus, simplicia, long. 0·005 ad 0·006, crass. 0·001 ad 0·0007 mm.

2. ***Ps. subsulphurea** Wain., Etud. Lich. Brés. II. p. 205.

GOLUNGO ALTO.—Ad truncos vigentes *Milletiæ* prope Trombeta. No. **206** pr. p.
LOANDA (0 ad 1000 ped. s. m.).—Ad corticem arborum et fruticum in collibis littoralibus prope Alto da Boa Vista. Nos. **195** pr. p., **222** pr. p.

3. **Ps. (Trypethelium) pustulata** Wain., sp. n.

Thallus sat crassus, olivaceo-glaucescens, irregulariter inæqualis, nitidiusculus, hypothallo nullo distincto. Pseudostromata elevata (circ. 2 ad 1·5 mm. alta), subgloboso-hemisphærica, basi abrupta aut passim leviter constricta, 2 ad 3·5 mm. lata, thallo obducta et thallo concoloria, KHO non reagentia, perithecia 2 ad 6 substrato separata includentia. Perithecium subglobosum, fusco-nigrum, integrum, tenue, ostiolo recte aut oblique disposito, in superficie pseudostromatis punctum nigrum circ. 0·2 mm. latum, neque umbonatum, nec impressum formante. Nucleus jodo non reagens. Paraphyses ramoso-connexæ, gelatinam copiosam percurrentes. Sporæ 8næ, oblongæ, apicibus obtusis, 7—5-septatæ, levissime obscuratæ, long. circ. 0·188, crass. 0·042 mm., membrana bene gelatinoso-incrassata, strato firmiore sat tenui cavitates subglobosas circumdante, in KHO e partibus gelatinosis secedente, ita ut loculi cellulas omnino liberas formant.

AMBRIZ.—Ad truncum vetustum sed vigentem arboris N-cumbi dictae (i.e. *Calesiam antiscorbutica*) prope Ambriz. No. **190**.

4. **Ps. (Trypethelium) sphærocephala** Wain., sp. n.

Thallus sat tenuis, pallidus, tenuissime sulphureo-albido-pruinosus, lævigatus, hypothallo nigricante partim limitatus. Pseudostromata elevata (circ. 1 mm. alta), subglobosa aut subgloboso-tuberosa, circ. 0·8 ad 1·5 mm. lata, basi bene constricta strato thallino tenui sulphureo-albido-pruinoso obducta aut parte superiore demum leviter denudata nigricantiaque et tunc macula sulphureo-pallida rotundata 0·5 ad 0·4 mm. lata circa quodvis ostiolum (circ. 0·05 mm. latum) instructa, perithecia 6 ad 2 (rarius solitaria) confluentia, extus tuberculo indicata, includentia, materiam KHO reagentem non continentia. Perithecium fuligineum, integrum, globosum. Sporæ 8næ, decolores, oblongæ, pluriseptatæ (13-septatæ), loculis lenticularibus, long. circ. 0·080 ad 0·085, crass. 0·014 ad 0·018 mm., halone nullo indutæ.

LOANDA (0 ad 1000 ped. s. m.).—Ad corticem *Sterculiæ* prope Cacuaco. No. **191**.

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5. **Ps. (Trypethelium) ochroleuca** (Eschw.) Wain., Etud. Lich. Brés. II. p. 209.

Var. **effusa** Müll. Arg., Pyr. Cub. p. 392 (em.), Wain. *l.c.*

GOLUNGO ALTO.—Ad truncos vigentes in sylvis primitivis ad Cungulungulo. No. **200**. Ad Caretete (i.e. *Phyllanthus discoideus* Müll. Arg.) locis editis prope Quilombo Quiacatubia. No. **192**.

6. **Ps. (Trypethelium) tropica** (Ach.) Müll. Arg.; Wain., Etud. Lich. Brés. II. p. 210.

BENGO.—Ad corticem *Fici* prope Bengo. No. **215**. Ad corticem variarum arborum inter Quifandongo et Barra do Bengo. No. **221**.

ZENZA DO GOLUNGO.—Supra truncos Leguminosarum ad margines flumini Calucala. No. **218**.

GOLUNGO ALTO.—Ad corticem *Fici* prope Luinha. No. **213**. Ad truncos *Zygiæ* (*Albizziæ*) in sylvis primitivis prope Trombeta. No. **249**. Ad truncos *Fici* et *Spondiadis* prope Sange et Bango-Aquitamba. Nos. **344** pr. p., **217**. Ad truncos *Meliæ* (Bombolo) in sylvis primitivis cet. in monte Cungulungulo. Nos. **201** pr. p., **251** (**214**, **226**, **383** pr. p.). Puricacarambola, ad corticem arboris. No. **227**.

LOANDA (0 ad 1000 ped. s. m.).—Ad corticem *Spondiadis* in Zamba Grande. No. **216**. Ad corticem arborum in collibus littoralibus prope Boa Vista. Nos. **194** pr. p., **222** pr. p.

BARRO DO DANDE. Ad Spondiaceas et Rhizophoras juxta ripas fluminis Lifune. Nos. **199** pr. p., **219** pr. p., **220**.

7. **Ps. (Heterothelium) Bengoana** Wain., sp. n.

Thallus epiphlœodes, tenuis, albidus, lævigatus, opacus, hypothallo nullo distincto aut partim nigricante limitatus, KHO non reagens. Apothecia solitaria, numerosa, verrucas 0·25 ad 0·2 mm. latas, hemisphæricas, nigras denudatasque aut basi anguste strato thallino obductas formantia, ostiolo leviter impresso. Perithecium fuligineum, dimidiatum, lateribus rotundatis, basi deficiens. Paraphyses ramoso-connexæ, numerosæ. Asci subcylindrici, long. 0·040, crass. 0·012 mm. Nucleus albus, jodo non reagens (metaplasma ascorum jodo rubescens). Sporæ 8næ, distichæ, oblongæ aut ovoideo-oblongæ, decolores, long. 0·016 ad 0·020, crass. 0·004 ad 0·006 mm., 3-septatæ, loculis lenticularibus, sat æqualibus. Affinis est *Ps. diremtæ* (Nyl.).

BENGO.—Ad ramulos arboris prope Quifandongo. No. **437**.

8. **PORINA** (Ach.) Wain.

1. **P. (Segestria) nucalis** Wain., sp. n.

Thallus sat tenuis, gibberosus sive verruculis minutissimis (circ. 0·1 ad 0·05 mm. latis) crebre inspersus, glaucescens vel cinereo-glaucescens, parum nitidus, hypothallo nigricante partim limitatus. Apothecia verrucas 0·5 ad 0·4 mm. latas, elevato-hemisphæricas aut rarius demum depresso-subglobosas, basi abruptas aut rarius leviter constrictas, amphithecio thallino tenui primum obductas, vertice convexo demum denudatas pallidasque, ostiolo vulgo leviter umbonato vix 0·1 mm. lato rufescente aut fusco-rufescente instructas formante. Perithecium pallidum, globosum. Paraphyses simplices. Sporæ 8næ, decolores, fusiformes, apicibus obtusis, 7—5-septatæ, loculis æqualibus, strato

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gelatinoso crasso indutæ, long. 0·042 ad 0·046, crass. 0·012 mm. (strato gelatinoso non computato). *P. nuculæ* Ach. est affinis, at apotheciis apice haud impressis et sporis minoribus ab ea differens.

SIERRA LEONE.—Ad truncos vigentes arboris "Hog-Plum" (i.e. *Spondias Mombin* L.) cultæ prope Freetown. No. **235**.

2. **P. tetraceræ** (Ach.) Müll. Arg., Pyr. Cub. p. 401; Wain., Etud. Lich. Brés. II. p. 223.

Verrucaria Tetraceræ Ach., Meth. Lich. p. 121.

CAZENGO.—Ad ramulos *Alsodeiæ* in dumetosis ad flumen Luinha. No. **246**. Sporæ in hoc specimine long. 0·032 ad 0·040, crass. 0·005 ad 0·007 mm., fusiformes, 7-septatæ, strato gelatinoso nullo. Apothecia ostiolo fuscescente. Thallus sat tenuis, glaucescens, arcte adnatus, haud desquamescens. Hypothallus parum distinctus. Dicatur var. **adnata** Wain. Forsan non est autonoma species, quamquam thallo a *P. tetraceræ* differens, et intermedia inter *P. tetraceræ* et *P. variegatam* Fée est. Etiam Wain. Lich. Bras. Exsicc. n. 459 et 507 intermedii inter has species sunt, magis cum posteriore congruentes. Transire ita hæ species videntur.

3. **P. desquamescens** Fée, Ess. Crypt. Ecorc. Suppl. p. 75; Müll. Arg., Lich. Afr. Occ. p. 41; Wain., Etud. Lich. Brés. II. p. 222.

Corticola ad flumen Quillu (leg. Pechuel-Loesche) et prope Pungo Andongo in Angola (leg. Soyaux), teste Müll. Arg., *l.c.*

4. **P. Africana** Müll. Arg., Lich. Afr. Occ. p. 41.

Corticola ad flumen Quillu leg. Pechuel-Loesche, teste Müll. Arg., *l.c.*

5. **P. Sangeana** Wain., sp. n.

Thallus epiphlœodes, tenuis, cinereus, sat lævigatus, sat opacus, hypothallo nullo distincto. Apothecia verrucas 0·2 mm. latas, hemisphæricas, basi demum sat abruptas formantia, amphithecio thallino thallo concolore parte inferiore obducta, vertice demum late denudato et cæruleonigricante, convexo. Perithecium pallidum, vertice cæruleonigricante. Nucleus jodo non reagens. Paraphyses simplices, septatæ. Asci oblongi, membrana tenui. Sporæ 8næ, distichæ, fusiformes, apicibus sat obtusis aut sat acutis, 5- ad 7-septatæ, loculis demum sat æqualibus, decolores, strato gelatinoso nullo indutæ, long. 0·017 ad 0·022, crass. 0·006 ad 0·007 mm. Sporis crassioribus a *P. argillacea* Müll. Arg. differt.

GOLUNGO ALTO.—Ad corticem arboris Artocarpeæ, Musibiri dictæ (i.e. *Myrianthus arboreus*), prope Sange. No. **376** pr. p.

6. **P. argillacea** Müll. Arg., Lich. Afr. Occ. p. 42.

Ad corticem prope flumen Quillu leg. Pechuel-Loesche, teste Müll. Arg., *l.c.*

7. **P. (Sagedia) elæidis** Wain., sp. n.

Thallus tenuis, epiphlœodes, albidus, sat lævigatus, sat opacus, hypothallo nigricante partim limitatus. Gonidia chroolepoidea,

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concatenata, cellulis parvis. Apothecia verrucas 0·25 mm. latas, depresso-hemisphæricas, nigras, nudas, vertice convexas, ostiolo parum prominente instructas formans. Perithecium fuscofuligineum, dimidiatum, basi deficiens. Paraphyses neque ramosæ, nec connexæ, sat numerosæ. Asci cylindrico-clavati, long. circ. 0·060, crass. 0·010 mm. Sporæ 8næ, distichæ, decolores, oblongæ aut ovoideo-oblongæ, 1-septatæ, haud constrictæ, septo fere in medio aut cellula angustiore paullo longiore, long. 0·014 ad 0·017, crass. 0·005 mm. *P. vagæ* (Nyl., Exp. Pyrenoc. p. 55) Müll. Arg., Lich. Exot. p. 283, est affinis.

AMBRIZ.—Ad corticem vetustum in trunco *Elæidis guineensis*. No. **260** pr. p.

8. **P.** (**Phylloporina**) **epiphylla** Fée, Ess. Crypt. Ecorc. Suppl. p. 76 ; Wain., Etud. Lich. Brés. II. p. 226.

Var. **præstans** (Nyl.) Wain., Lich. Antill. p. 35.

Verrucaria præstans Nyl., Lich. Angol. p. 15.

GOLUNGO ALTO.—Ad folia *Dracænæ*. No. **238** pr. p. Ad folia *Celastri* (no. **269**) et *Chailletiæ* in sylvis primævis in Serra de Alta Queta (no. **309** pr. p.).

Perithecium pallidum, KHO pulchre roseum. Sporæ 5—7-septatæ. Thallus haud distincte gibberosus aut passim verruculis minutissimis parum distinctis inspersus.

9. **P. rufula** (Krempelh.) Wain., Etud. Lich. Brés. II. p. 227.

Var. **minuscula** Wain.

Apotheciis minoribus a var. *rubicolore* (Stirt.) Wain. differt. Perithecium dimidiatum, rufescens, basi albidum, 0·2 ad 0.14 mm. latum, inferne sensim dilatatum acutatumque, in parte rufescente gonidia phycopeltidea, in thallum circa apothecium radiatim continuata continens. Sporæ long. 0·017 ad 0·020, crass. 0·003 mm., oblongæ, 3-septatæ.

GOLUNGO ALTO.—Ad folia sempervirentia *Chytranthi Mannii* locis sylvaticis umbrosis prope Fonte de Capopa. No. **319** pr. p.

9. **STRIGULA** Fr.

1. **Str.** (sect. **Ochrothaele**) **hypothelia** Nyl., Lich. Ang. p. 15.

Thallus plagulas circ. 5 ad 8 (ad 3) mm. latas formans, radiatim sulcatus sive laciniis fere usque ad ambitum confluentibus sulcoque separatis instructus, radiatim etiam costulatus undulatusve, ambitu crenatus sive breviter lobatus, crenis lobisve 0·7 ad 2 mm. latis, glaucescens, pilis destitutus. Apothecia verrucas 0·3 ad 0·5 mm. latas, late mastoideo-conicas, basin versus sensim dilatatas, strato thallino thallo concolore omnino obductas aut ostiolo leviter prominente demum nigricante minutissimo (circ. 0·050 mm. lato) instructas formantia. Perithecium pallidum, vertice fuscescenti-pallidum. Paraphyses neque ramosæ, nec connexæ. Asci cylindrici aut cylindrico-clavati. Sporæ monostichæ aut rarius distichæ, fusiformes, rectæ aut parcius obliquæ, 1-septatæ, haud aut leviter constrictæ, long. 0·013 ad 0·017, crass. 0·004 ad 0·005 mm., 8næ, cellulis fere æque longis.

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GOLUNGO ALTO.—Ad folia *Fici* in sylvis densissimis prope Fonte de Capopa (no. **271** pr. p.) et in sylva primitiva prope Quisuculo (no. **288** pr. p.).

2. **Str.** (sect. **Melanothæle**) **astroidea** Wain., sp. n.

Thallus plagulas 1·5 ad 3 mm. latas formans, tenuis, laciniatus, laciniis angustissimis (circ. 0·2 mm. latis), linearibus aut apicem versus angustatis aut irregularibus, discretis aut centro plus minusve late connatis (raro partim brevissimis crenæformibusque), planis lævigatisque aut sulca una longitudinali instructis, glaucovirens, aut demum glaucescenti-albescens, pilis destitutus. Apothecia verrucas 0·25 mm. latas, late mastoideo-conicas, basin versus sensim dilatatas et strato thallino obductas, apice late nigricantes formantia. Perithecium fuligineum, dimidiatum, basi deficiens. Paraphyses neque ramosæ, nec connexæ. Asci ventricosi basinque versus incrassatæ aut subcylindrici, long. circ. 0·040 ad 0·045, crass. 0·011 ad 0·012 mm. Sporæ 8næ, distichæ, decolores, fusiformes aut fusiformi-oblongæ aut parce ovoideo-oblongæ, apicibus acutiusculis aut obtusiusculis aut altero apice obtuso, long. 0·013 ad 0·016, crass. 0·004 ad 0·005 mm., 1-septatæ, cellulis sat æqualibus aut altera paullo longiore. Pycnides frequentiores quam apothecia, conceptaculo denudato, fuligineo, dimidiato, basi deficiente, circ. 0·130 mm. lato. Stylosporæ oblongæ aut ovoideo-oblongæ, apicibus obtusis aut rarius rotundatis, rectæ, 1-septatæ, decolores, long. 0·013 ad 0·014, crass. 0·003 mm. Huc forsan pertinet *Str. elegans* var. *oxyloba* Müll. Arg., Lich. Usamb. p. 293, sine apotheciis (ut videtur) lecta (nomen etiam ineptum).

GOLUNGO ALTO.—Ad folia arborum prope flumen in Varsea de Bumba (no. **260** pr. p.) et prope cataractam fluminis Cuango in Sange (no. **276** pr. p.). Huc evidenter etiam pertinent specimina stylosporis solis lecta ad folia *Alchorneæ* prope Sange (no. **261** pr. p.), ad folia annua *Bombacis buonopozensis* prope Fonte de Capopa (nos. **293** pr. p., **294** pr. p.), ad folia Zanthoxyli in sylvis prope Mussengue (no. **307** pr. p.) in Golungo Alto, sicut etiam ad folia arboris Burseraceæ (quæ gummi elemi producit—i.e. *Canarium edule*) in sylvis editis ad Dalatando in Cazengo (no. **262**).

3. **Str. angustissima** Wain., sp. n.

Thallus plagulas 2 ad 4 mm. latas formans, bene laciniatus, laciniis angustissimis (circ. 0·1 mm. latis), bene convexis, linearibus aut leviter irregularibus, bene discretis aut partim plus minusve confluentibus, at usque ad centrum distinctis et in jugum convexum continuatis, bene varieque ramosis, vulgo bene pilosis, haud sulcatis, glaucescenti-albidis. Apothecia verrucas 0·25 mm. latas, mastoideo-conicas, basin versus sensim dilatatas et strato thallino obductas, apice late nigricantes formantia. Perithecium fuligineum, dimidiatum, basi deficiens. Asci cylindrici aut basin versus attenuati, long. 0·040 ad 0·045, crass. 0·008 ad 0·009 mm. Sporæ 8næ, distichæ, decolores, fusiformes, apicibus acutis aut altero apice rarius obtuso, long. 0·010 ad 0·011, crass. 0·0025 ad 0·005 mm., 1-septatæ, cellulis æqualibus.

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GOLUNGO ALTO.—Ad folia coriacea arbusculæ in sylvis densis prope Alta Queta. No. **300** pr. p.

Str. pulchellam Müll. Arg. in memoriam revocat, at laciniis angustioribus et sporis minoribus distichisque et apotheciis minoribus ab ea differt.

4. **Str. Africana** Wain., sp. n.

Thallus plagulas 1 ad 5 mm. latas suborbiculares formans, ambitu subinteger aut leviter crenulatus, crassitudine mediocris, virescens (aut ætate albicans), haud pilosus, vulgo lævigatus aut rarius leviter rugosus, nitidus. Apothecia verrucas 0·3 ad 0·4 mm. latas, mastoideo-conicas, basin versus sensim dilatatas, strato thallino obductas, griseas vel griseo-obscuratas formantia, ostiolo minuto, leviter prominente, fuligineo, denudato. Perithecium fusco-fuligineum, dimidiatum, basi deficiens. Asci cylindrico-clavati aut cylindrico-ventricosi; metaplasma ascorum jodo rubescens (ceterum nucleus jodo non reagens). Paraphyses neque ramosæ, nec connexæ. Sporæ 8næ, distichæ, decolores, fusiformes aut rarius ovoideo-fusiformes aut ovoideo-oblongæ, apicibus acutis aut rarius obtusiusculis aut altero apice obtuso, long. 0·015 ad 0·020, crass. 0·004 ad 0·006 mm., 1-septatæ, septo in medio aut fere in medio, haud aut parum constrictæ. Pycnides (verisimiliter huc pertinentes in no. 263), conceptaculo fuligineo, denudato, circ. 0·1 mm. lato. Stylosporæ fusiformes aut oblongæ, apicibus acutiuculis aut obtusis, rectæ, decolores, 1-septatæ, long. 0·013 ad 0·016, crass. 0·003 ad 0·004 mm. Habitu similis *Str. eleganti*, at thallo minus variabili, integriore et sporis 1-septatis ab ea differens.

GOLUNGO ALTO.—Ad faciem superiorem foliorum prope Sange. No. **261** pr. p. Ad faciem superiorem foliorum *Leptonychiæ urophyllæ* in sylvis primitivis prope Capopa. No. **265**. Ad faciem superiorem foliorum *Fici* in sylva virginea prope Quisuculo. No. **288** pr. p.

5. **Str. atrocarpa** Wain., sp. n.

Thallus plagulas 0·5 ad 3 mm. latas suborbiculares aut difformes formans, ambitu subinteger aut leviter crenulatus, sat tenuis, glaucovirescens, planus, haud pilosus, lævigatus, sat opacus, hypothallo nullo distincto. Apothecia verrucas 0·3 ad 0·4 mm. latas, hemisphæricas aut mastoideo-hemisphæricas, atras, nudas formantia, ostiolo demum leviter prominente. Perithecium fuligineum, dimidiatum, basi deficiens. Paraphyses neque ramosæ, nec connexæ. Asci cylindrici, long. 0·055, crass. 0·004 mm., membrana tenui. Sporæ 8næ, monostichæ, decolores, fusiformes aut ovoideo-fusiformes aut rarius oblongæ aut ovoideo-oblongæ, apicibus acutis aut rarius obtusis, long. 0·008 ad 0·009, crass. 0·002 ad 0·0035 mm., 1-septatæ, septo in medio, haud constrictæ. Conceptacula pycnoconidiorum hemisphærica, atra, dimidiata, nuda, 0·120 ad 0·160 mm. lata (in eodem thallo cum apotheciis). Pycnoconidia simplicia, fusiformia aut oblonga, long. 0·003 ad 0·005, crass. 0·0007 ad 0·002 mm. Affinis est *Str. complanatæ* (Fée) Müll. Arg., Pyr. Cub. p. 381 (Wain., Lich. Antill. p. 35),

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at sporis vulgo fusiformibus et apotheciis totis atris nudisque ab ea differens.

GOLUNGO ALTO.—Ad faciem superiorem folii arboris Sapindaceæ prope Fonte de Capopa. No. **304** pr. p. Ad faciem superiorem foliorum *Fici urceolaris* Welw. in sylva primitiva prope Quisuculo. No. **288** pr. p.

Species sequentes, verisimiliter sine apotheciis inexacte determinatæ, a Müll. Arg. in Lich. Afr. Occ. (Linnæa 1880) p. 41 commemorantur: *Str. complanata* (Fée) Müll. Arg. var. *ciliata* (Mont.) Müll. Arg., Pyr. Fée n. p. 5, Lich. Beitr. (1890) n. 1570 (ad flumen Quillu: Pechuel-Loesche), *Str. elegans* (Fée) Müll. Arg. var. *genuina* Müll. Arg., Pyr. Féean. p. 5, var. *viridissima* (Fée) Müll. Arg., *l.c.*, var. *nematora* Müll. Arg., Pyr. Cub. p. 380, Lich. Beitr. n. 1566 (ad Chinchoxo: Soyaux), var. *Féei* (Mont.) Müll. Arg., Pyr. Cub. p. 380 (ad flumen Quillu: Pechuel-Loesche).

10. **ARTHOPYRENIA** (Mass.) Wain.

1. **A. (Polymeridium) obtecta** Müll. Arg., Lich. Beitr. (1883) n. 638.

Sagedia obtecta Müll. Arg., Lich. Afr. Occ. (Linnæa 1880) p. 42. *Verrucaria tecta* Stizenb., Lich. Afr. p. 223.

Ad corticem arboris prope flumen Quillu leg. Pechuel-Loesche, teste Müll. Arg., *l.c.*

2. **A. (Acrocordia) recepta** Müll. Arg., Lich. Beitr. (1883) n. 631.

Sagedia alboatra Müll. Arg., Lich. Afr. Occ. (Linnæa 1880) p. 42. *Verrucaria alboatra* Nyl. var. *recepta* Stizenb., Lich. Afr. p. 223.

Ad corticem emortuum et semiputridum Palmarum prope flumen Quillu leg. Pechuel-Loesche, teste Müll. Arg., *l.c.*

11. **DIDYMELLA** Sacc.

Hoc genus gonidiis carens ad fungos pertinet.

1. **D. Loandensis** Wain., sp. n.

Mycelium maculam albidam formans, gonidiis destitutum. Apothecia verrucas hemisphæricas formantia, 0·3 ad 0·35 mm. lata, nigra. Perithecium fuligineum, dimidiatum, hemisphæricum, basi deficiens, denudatum aut basi tenuissime velatum. Nucleus jodo non reagens. Paraphyses numerosæ, ramoso-connexæ. Asci cylindrici. Sporæ 8næ, distichæ, decolores, ovoideo-oblongæ, 1-septatæ, septo fere in medio, haud constrictæ, strato gelatinoso nullo indutæ, long. 0·013 ad 0·020, crass. 0·0035 ad 0·005 mm. Sporis *Verrucariæ subprostanti* Nyl., Exp. Pyrenoc. p. 56, Lich. Nov.-Gran. Prodr. p. 491 (Müll. Arg., Lich. Beitr. no. 633), congruit, at apotheciis minoribus et ascis distichis ab ea differt et habitu subsimilis *Didymellæ cinchonæ* (Ach.) Wain., Etud. Lich. Bres. II. p. 233. Ad fungos pertinet.

LOANDA (0 ad 1000 ped. s. m.).—Ad corticem arboris junioris prope Maianga do Rei. No. **451** pr. p.

12. **TOMASELLIA** Mass.

1. **T. euphorbiæ** Wain., sp. n.

Mycelium macula albida pallidave indicatum, gonidiis destitutum. Pseudostromata 2 ad 0·5 mm. lata, difformia, tenuia, ex

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apotheciis crebre aggregatis separatisque et pro parte confluentibus formata. Perithecia fuscofuliginea, dimidiata, basi deficientia, hemisphærica, latere leviter anguloso-dilatata. Nucleus ellipsoideo-compressus, jodo non reagens. Paraphyses ramoso-connexæ. Asci ovoideo-ventricosi, long. circ. 0·035, crass. 0·015 mm. Sporæ 8næ, polystichæ, decolores, oblongæ aut rarius ovoideo-oblongæ, 1-septatæ, septo in medio, haud constrictæ. Ad fungos pertinet.

LOANDA (0 ad 1000 ped. s. m.).—Ad truncos vetustiores *Euphorbiæ* arborescentis (Quisoma—i.e. *E. candelabrum*) in collibus sabulosis prope Boa Vista. No. **189**.

Genus *Tomasellia* Mass. (Flora 1856, p. 283) ad fungos relegandum est. Ejus typus est *T. arthonioides* Mass. (Hepp, Flecht. Eur. n. 896), quæ gonidiis est destituta. Diversa est *Pyrenula* (subg. *Melanotheca*) *arthonioides* (Eschw.) Wain. (Müll. Arg., Pyr. Cub. p. 396).

LICHENES IMPERFECTI.

Lepraria xanthina Wain., sp. n.

Habitu similis est *Lepрariæ chlorinæ* Ach. (Wain., Lich. Antill. p. 38), at hyphis tenuioribus leptodermaticis instructa. Thallus citrinus, farinosus, KHO solutionem luteam effundens, hyphis 0·001 aut rarius 0·002 mm. crassis. Gonidia cystococcoidea, diam. 0·012 ad 0·006 mm., membrana sat tenui. Huc etiam *Lepraria* in Wain. Lich. Antill. p. 37 commemorata pertinet. Forsan hæc species a *Caliciis* est evoluta.

GOLUNGO ALTO.—Frequenter ad corticem *Ficorum* prope Bango et Cambondo. No. **447**. Ad corticem *Acaciæ* prope Camilungo. No. **338** pr. p. Ad corticem arboris prope Puri-cacarambola. No. **448**.

CONGO.—Ad corticem *Elæidis guineensis* prope Porta do Ambriz. No. **446**.

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FUNGI.

By ANNIE LORRAIN SMITH.

I. PHALLOIDEÆ.

1. **DICTYOPHORA** Desv. Journ. de Bot. ii. p. 92, 1809.

1. **D. phalloidea** Desv. *l.c.*

Phallus tunicatus Schlecht. Linn. vol. xxxi. p. 123 (1861).

Golungo Alto.—On damp soil in the dense woods of Serra de Alto Queta, during the rainy season; April 1855. Evidently very rare. Specimens were observed only during the three years 1854–57. No. **121**.

2. **KALCHBRENNERA** Berk. Gard. Chron. vol. v. p. 785, 1876.

1. **K. corallocephala** Kalchbr. Abh. Ber. Natur. Akad. d. Wiss. Budapest Bd. X. No. xvii. p. 21, 1880.

Lysurus corallocephalus Welw. & Curr. Trans. Linn. Soc. xxvi. 1870, p. 287. t. 17. f. 8.

Pungo Andongo.—In plantations of *Zea Mays*, on a moist sandy-clay soil, in fine weather, without any thunder, after three days of frequent rain. A single specimen growing in the Præsidium; 10 Dec. 1856. No. **119**.

3. **CLATHRUS** Mich. Nova Plant. Gen. p. 214, 1729.

1. **C. angolensis** Ed. Fischer. Jahrb. des botan. Gartens und des botan. Museums zu Berlin, 1886, p. 70.

Laternea angolensis Welw. & Curr., *l.c.*, p. 286. t. 17. f. 7.

Pungo Andongo.—On volcanic rocks covered with soil, within the Præsidium, near Catete. One specimen only, gathered in fine weather; 10 Dec. 1856. No. **120**.

II. NIDULARIACEÆ.

1. **CYATHUS** Hall Hist. Helvet. iii. p. 127.

1. **C. striatus** Hoffm. Veget. Crypt. 1790. p. 83. t. viii. f. 3.

Pungo Andongo.—Sparsely on rotten wood in the primitive damp woods near the Præsidium; Feb. 1857. No. **113**. On fallen branches among rotten leaves in open neglected fields near Sansamanda, on the banks of the river Cuanza; March 1857. No. **114**.

III. LYCOPERDACEÆ.

1. **PODAXON** Fr. Syst. Myc. iii. p. 62 (1829).

1. **P. loandensis** Welw. & Curr., *l.c.*, p. 288. t. 20. figs. 5, 6, 7.

Loanda.—Frequent in sandy pastures near the sea in Penedo, towards Conceição; March 1854. No. **115**.

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2. **P. mossamedensis** Welw. & Curr., *l.c.*, t. 17. f. 23. and t. 19. figs. 1, 2, 3.

MOSSAMEDES.—In sandy thickets on the banks of the river Maiombo; Oct. 1859. No. **149.**

LOANDA.—Frequent in meadows and sandy maritime pastures near Penedo, and in Praia de Zamba Grande, near Loanda; Dec. 1853 and Feb. 1858. No. **149*a***.

3. **P. elatus** Welw. & Curr., *l.c.*, t. 19. figs. 4, 5, 6.

HUILLA.—Very sparse in sandy mixed woods (i.e. of *Proteæ*, *Myrtaceæ*, *Strychnos*, *Combretum*, *Acacia*, *Cæsalpinia*, etc.) between Lopollo and Monino; Jan. 1860. No. **148.**

2. **SPHÆRICEPS** Welw. & Curr., *l.c.*, p. 290.

1. **S. lignipes** Welw. & Curr., *l.c.*, p. 290. t. 18. fig. 2.

MOSSAMEDES.—In sandy thickets, composed chiefly of *Tamarix*, on the banks of the river Caroca, near Cabo Negro, about 16° S. lat., about 12 miles from the sea; Sept. 1859. No. **150.**

3. **TYLOSTOMA** Pers. Syn. Meth. Fung. p. 139 (1801).

1. **T. angolense** Welw. & Curr., *l.c.*, t. 20. figs. 10, 11.

MOSSAMEDES.—Very rare. On sandy hills covered with *Euphorbia bellica* Hiern, to the south of Mossamedes; July 1859. No. **147.**

4. **GEASTER** Mich. Nova Plant. Gen. p. 220, 1729.

1. **G. mirabilis** Mont. Ann. Sci. Nat. ser. 4. vol. iii. p. 139. t. 6. fig. 8.

GOLUNGO ALTO.—Rare and sparse in the shady primitive woods of Serra de Alto Queta at a place called Casengue, on fallen leaves and bark, also on rotten trunks; Aug. 1856. On rotten trunks in the primitive woods of Quisucula and near Casengue; April 1856. No. **107.**

2. **G. fimbriatus** Fr. Syst. Myc. iii. p. 16 (1829).

PUNGO ANDONGO.—Rare, on the ground near the river Casalalé in the Præsidium; Dec. 1856. No. **108.**

5. **LYCOPERDON** Tourn. Inst. Rei Herb. p. 563 (1700).

1. **L. bicolor** Welw. & Curr., *l.c.*, p. 290. t. 20. fig. 12.

HUILLA.—In very damp woody pastures between Lopollo and Empalanca; May 1860. No. **146.**

2. **L. cæspitosum** Welw. & Curr., *l.c.*, p. 289. t. 20. figs. 1, 2.

HUILLA.—Gregarious in upland poor meadows of Morro de Lopollo; April 1860. No. **145.**

3. **L. golungense** Welw. & Curr., *l.c.*, t. 20. fig. 13.

GOLUNGO ALTO.—At the base of decayed trunks in the elevated woods of the mountain Cungulungulo; Feb. 1855. No. **118.**

4. **L. asperrimum** Welw. & Curr., *l.c.*, t. 20. figs. 3, 4, 14.

MOSSAMEDES.—In sandy thickets on the margin of Lagoa de Giraûl in a brackish place; July 1859. No. **142.** In sandy meadows near Maiombo, on the banks of the river; Oct. 1859. No. **144.** Currey says, *l.c.*, "No. 144 seems to be the same species, but exhibits no spines on the peridium." Though evidently an older specimen than No. 142,

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there are still traces of spines, and the spores and capillitium are identical in form, size, and colour.

5. **L. Curreyi** Mass. in Trans. Journ. R. Micros. Soc. June 1887. p. 12.

L. radicatum Welw. & Curr., *l.c.*, t. 20. figs. 8, 9. *L. Welwitschii* De Toni in Sacc. Syll. Fung. vii. p. 127 (1888).

LOANDA.—Very rare. In grassy places amongst thickets near Penedo; March 1854. No. **116.**

6. **L. Welwitschii** Mass., *l.c.*, p. 25.

L. tomentosum Welw. & Curr., *l.c.*, p. 288. t. 19. figs. 7, 8.

GOLUNGO ALTO.—On damp ground amongst rotten leaves in the primitive woods of Quisucula, near Bango; Feb. 1855. No. **117.**

IV. AGARICINEÆ.

1. **AGARICUS** Dill. Linn. Gen. Plant. gen. 1074. p. 492 (1754).

1. **A. (Omphalia) centenarius** Berk. & Curt. Ann. Nat. Hist. Ser. ii. vol. xii. p. 420, 1853.

GOLUNGO ALTO.—Growing abundantly on rotten trunks in woods of Mussungue; May 1856. No. **297.**

2. **PLEUROTUS** Fr. Syst. Myc. I. p. 178 (1821).

1. **P. semisupinus** B. & Br. Journ. Linn. Soc. xi. p. 529, 1871.

GOLUNGO ALTO.—On bark of decaying trunks of trees in Cungulungulo; Feb. 1855. No. **342.**

3. **LENTINUS** Fr. Syst. Orb. Veg. I. p. 77 (1825).

1. **L. umbrinus** Reichardt Novara-Exped. Bot. p. 143. pl. xxii. fig. 3, 1870.

CAZENGO.—On old trunks of trees in the elevated woods of Muxaûla; June 1855. No. **348.**

4. **LENZITES** Fr. Epicr. p. 403 (1836–38).

1. **L. repanda** Fr. Epicr. p. 404.

GOLUNGO ALTO.—On dead trunks in woods of Mussengue; May 1855. No. **469.** Frequent on old trunks beside rivulets near Sange and Bango. No. **468.**

BUMBO.—Rather rare in woods of "Mutuate," *Copaiba Mopane* O.K. between Bumbo and Bruco; June 1869. No. **488.**

5. **SCHIZOPHYLLUM** Fr. Obs. Myc. I. p. 103 (1815)

1. **S. commune** Fr., *l.c.*

MOSSAMEDES.—On dead trunks in the woods near the mouth of the river Bero, and at Cavalheiros; July 1859. No. **351.**

HUILLA.—On dead trunks close to the huts of the negroes near Humpata; May 1860. No. **352.** In woods of Panda (*Brachystegia*) near lake Ivantâla; Feb. 1860. No. **352***b*.

GOLUNGO ALTO.—In the elevated primitive woods on the mountains of Alto Queta on dead trunks of *Pterocarpus tinctorius* and *Melia* "Bombolo"; May 1856. No. **353.**

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V. POLYPOREÆ.

1. **POLYPORUS** Mich. Nova Plant. Gen., gen. 129, 1729.

1. **P. brumalis** Fr. Syst. Myc. I. p. 348 (1821).

GOLUNGO ALTO.—On rotten trunks in the primitive woods of Quisucula near Bango-Aquitamba ; Aug. 1857. No. **251**.

PUNGO ANDONGO.—On rotten trunks of *Phœnix reclinata* on the island Calemba, near Quisonde ; March 1857. No. **253**. In sandy woods between Condo and Quisonde near the river Cuanza ; March 1857. No. **253**.

2. **P. gilvus** Schwein. Fung. Carolin. No. 897, in Leipzig Schr. Nat. Gesell. I. p. 96, 1822.

HUILLA.—On trunks of almost dead *Leguminosæ* in woods of Panda (*Brachystegia*) near the lake of the Hippopotami (Ivantâla) ; Feb. 1860. No. **377**.

GOLUNGO ALTO.—On prostrate small trunks of Moreira (*Chlorophora excelsa*) near Sobato Bango ; Sept. 1856. No. **391**.

PUNGO ANDONGO.—On branches of trees in the woods near Quitage ; March 1857. No. **392**.

3. **P. scruposus** Fr. Epicr. p. 473 (1836–38).

PUNGO ANDONGO.—On old rotting trunks near Condo, at the great cataract of the river Cuanza ; March 1857. No. **390**.

4. **P. noctilucens** Lagerh. Ueber. ein. neu. phosph. *Polyporus* in Bol. da Soc. Brot. 1889, pp. 178–80.

PUNGO ANDONGO.—In light clear woods near Condo and Candumba ; March 1857. No. **385**. Remarkably phosphorescent at night.

2. **FOMES** Fr. Nov. Sym. p. 47 (1851).

1. **F. lucidus** Fr., *l.c.*, p. 61.

PUNGO ANDONGO.—March 1857. No. **247**. In woods composed of *Mimosæ* and *Brachystegia tamarindoides* Welw. vel aff. (Muzamba), on sandy soil into which the stalk of the fungus had penetrated deeply, between Condo and Quisonde ; March 1857. No. **257**.

2. **F. igniarius** Fr. Syst. Myc. I. p. 375 (1821).

SIERRA LEONE.—On old trunks in Sugar-loaf Mountains, rare ; Sept. 1853. No. **386**.

3. **POLYSTICTUS** Fr. Nov. Sym., p. 70 (1851).

1. **P. xanthopus** Fr., *l.c.*, p. 74.

GOLUNGO ALTO.—On decaying trunks in Mata de Quisucula ; Dec. 1855. No. **238**.

PUNGO ANDONGO.—Very rare. On decaying trunks of *Phœnix reclinata* on the great island of the river Cuanza called Calemba between Condo and Quisonde ; March 1857. No. **239**.

2. **P. affinis** Fr., *l.c.*, p. 74.

GOLUNGO ALTO.—Very rare. On old trunks of *Melia*, "Bombolo," in the elevated woods of M. de Queta ; June 1856. No. **249**.

3. **P. sanguineus** Fr., *l.c.*, p. 74.

GOLUNGO ALTO.—On fallen branches of the tree Mangue do Monte

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(*Corynanthe*), in the mountains of Alto Queta or Luinha ; July 1856. No. **366**. Not infrequently on semi-barked wood in all the forests, but not everywhere, Queta Occident. ; May 1856. No. **365**.

CAZENGO.—Rather rare on old trunks in dense woods ; Dec. 1854. No. **364**.

PUNGO ANDONGO.—Frequent on rotten dry trunks chiefly on the monuments of negroes near Condo and Pedras de Guinga, etc., also on the pit-roofs of elephant hunters near N-popo on the Cuanza ; Feb. 1857. No. **367**.

HUILLA.—Frequent on trunks of *Cæsalpinia* in woods near Ivantâla ; Feb. 1860. No. **363**.

4. **P. funalis** Fr., *l.c.*, p. 78.

GOLUNGO ALTO.—On rotten trunks of leafy trees (*Terebinthaceæ*) close to the river near Sange ; March 1855. No. **383**.

PUNGO ANDONGO.—On the trunks of trees referred to the *Spondiaceæ* near the great cataract of the river Cuanza behind Condo ; March 1857. No. **382**.

5. **P. floridanus** Fr., *l.c.*, p. 81.

BUMBO.—Frequent on decayed trunks of various trees in the shady woods of Serra de Xella ; June 1860. No. **470**.

6. **P. hirsutus** Fr., *l.c.*, p. 86.

GOLUNGO ALTO.—On decayed trunks of *Pseudospondias* (Mussondo) in woods near Camilungo ; March 1856. No. **472**.

7. **P. zeylanicus** Cooke Grev. vol. xiv. p. 85, 1886.

GOLUNGO ALTO.—On decayed trunks near the river Delamboa ; Feb. 1856. No. **482**.

8. **P. Peradenyæ** Cooke, *l.c.*, p. 84.

GOLUNGO ALTO.—On fallen branches in the shade at Cungulungulo ; May 1856. No. **476**.

9. **P. occidentalis** Fr. Nov. Sym., p. 90 (1851).

GOLUNGO ALTO.—On dead branches in dense woods, M. de Queta ; July 1856. No. **379**. On rotten trunks in elevated woods, Luinha ; July 1856. No. **380**. On old trunks in the woods of Mussengue ; May 1855. No. **494**. On old trunks of *Melia*, "Bombolo," between Cabondo and Sange ; Oct. 1854. No. **381**. On *Khaya anthotheca* C.DC. in the woods of Sobato de Mussengue ; Jan. 1856. No. **395**. On bark of "Tacula (*Pterocarpus tinctorius* Welw.), Senzala de Loanga ; Dec. 1855. No. **495**. On old trunks of *Celtis Henriquesii* (Sponia) in woods near Quibolo ; April 1856. No. **396**.

PUNGO ANDONGO.—Frequent on old trunks in forests near Bumba and Condo ; March 1857. No. **393**.

HUILLA.—On dead fences near Lopollo ; Jan. 1860. No. **374**.

AMBACA.—On old trunks of *Bauhinia* ; Aug. 1856. No. **493**.

10. **P. licnoides** Fr., *l.c.*, p. 92.

PUNGO ANDONGO.—On old trunks in *Mimosa* forests near Condo ; March 1857. No. **389**.

This species belongs to the *Fomes* group, as the pores are stratose in the older specimens, according to Montagne's description.

4. **PORIA** Fr. Nov. Sym., p. 70 (1851).

1. **P. vulgaris** Cooke Grev. vol. xiv. p. 109, 1886.

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GOLUNGO ALTO.—On rotten trunks in forests of Alto Queta ; May 1856. No. **398**. On fallen branches in dense woods near Camilungo ; June 1857. No. **399**.

5. **HEXAGONIA** Fr. Epicr. p. 496 (1836–38).

1. **H. sinensis** Fr. Nov. Sym. Myc. p. 100 (1851).

PUNGO ANDONGO.—Rather rare, on beams on the tombs of negroes near Quibinda, growing with *Hexagonia Welwitschii* A. L. Sm. ; March 1857. No. **497**.

HUILLA.—In the woods of Ivantâla ; Feb. 1860. No. **372***b*.

2. **H. crinigera** Fr. Rel. Afzel. Fung. Guin. No. 23. t. iv. f. 10 (1860).

LIBOLO (AMBRIZ ?)—On rotten trunks of trees in the country of Libolo between the river Dande and the river Loje or Ambriz ; specimen gathered in haste by the way ; Oct. 1858. No. **498**.

3. **H. variegata** Berk. Proc. Amer. Acad. Arts & Sci. vol. iv. p. 122, 1862.

CAZENGO.—On decayed branches of shrubs (*Dalhousiea*) in woods near Dalatando ; June 1855. No. **387**.

4. **H. polygramma** Mont. Cuba, p. 379. t. 14. f. 3 (1838–42).

GOLUNGO ALTO.—On dead branches of various trees in the dense woods of Sobato de Mussengue ; June 1856. No. **359**.

PUNGO ANDONGO.—On dry branches of shrubs in Mata de Quilanga ; Feb. 1857. No. **361**. On fallen branches of *Monodora angolensis* Welw. in Barranco of S. Antonio ; May 1857. No. **360**.

HUILLA.—On old dead trunks in woods of *Leguminosæ* (Panda) near the great lake Ivantâla ; Feb. 1860. No. **362**.

5. **H. Thollonis** Pat. & Hariot, Bull. Soc. Myc. vol. ix. p. 208, 1893.

HUILLA.—On fallen rotten branches in woods of Panda (*Brachystegia*, &c.) near lake Ivantâla ; Feb. 1860. No. **372**.

6. **H. Welwitschii** A. L. Sm. Journ. Bot. vol. xxxvi. p. 177 (May 1898).

PUNGO ANDONGO.—On rotten trunks on the sepulchres of negro chiefs in woods between Condo and Quisondo ; March 1857. No. **370**.

A second specimen was gathered in Angola, but is without date, number, or locality.

7. **H. Stuhlmanni** P. Henn. in Engl. & Prantl die nat. Pflanzenfam. Lief. 172. p. 184 (1898).

HUILLA.—No. **520**.

6. **DÆDALIA** Pers. Syn. Meth. Fung. p. 499 (1801).

1. **D. quercina** Pers., *l.c.*, p. 500.

BUMBO.—On old trunks in woods of Serra de Xella, rather rare ; June 1860. No. **486**.

7. **FAVOLUS** Fr. Orb. Veg. i. p. 76 (1825).

1. **F. tessellatus** Mont. Ann. Sci. Nat. Ser. 2. vol. xx. p. 365, 1843.

GOLUNGO ALTO.—On old rotten trunks in the dense forests of Sobato de Cabanga Cacalungo ; Jan. 1855. No. **254**.

The fungus was white when gathered, but has become yellow in drying.

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2. **F. brasiliensis** Fr. El. i. p. 44 (1828).

GOLUNGO ALTO.—On old trunks of palms (*Elæis guineensis*) in the elevated primitive woods of Sobato de Quilombo Quiacatubia; Feb. 1855. No. **255**.

3. **F. Rhipidium** Berk. in Hook. Journ. vol. vi. p. 319, 1847.

PUNGO ANDONGO.—Very rare on rotten wood in the elevated woods of Pedra de S. Antonio; Dec. 1856. No. **229**.

8. **LASCHIA** Fr. in Linnæa v. p. 533, 1830.

1. **L. lamellosa** Pat. Bull. Soc. Myc. 1888, p. 37, pl. xi. fig. 4.

PUNGO ANDONGO.—On rotten trunks almost entirely decayed in the dense humid woods of Mutolo near Pedras de Guinga; Jan. 1857. No. **343**.

VI. HYDNEÆ.

1. **IRPEX** Fr. Syst. Orb. Veg. i. p. 81 (1825).

1. **I. flavus** Kl. in Linn. viii. p. 488, 1833.

GOLUNGO ALTO.—On half-rotten branches in the primitive woods at the river Luinha; July 1856. No. **477**.

HUILLA.—Frequent on small trunks and dead branches in crowded woods near the lake Ivantâla; Feb. 1860. No. **489**.

The specimens are reflexed and dimidiate; when gathered dirty-white above and bright sulphur-colour below.

VII. THELEPHOREÆ.

1. **STEREUM** Pers. Obs. Myc. I. p. 35. emend. Fr. Epicr. p. 545.

1. **S. Ravenelii** Berk. & Curt. Grev. vol. i. p. 162, 1873.

HUILLA.—Growing in groups in moist pastures chiefly on dead *Eriocaulon*, near Lopollo; Jan. 1860. No. **425**. On dead grasses and other plants in dry thickets near Monino; April 1860. No. **427**.

2. **S. nitidulum** Berk. Not. Fung. Braz. Hook. Lond. Journ. ii. p. 10, 1843.

PUNGO ANDONGO.—Growing in groups among a rigid *Lycopodium* on volcanic rocks of Pungo Andongo; Nov. No. **426**.

3. **S. vespilloneum** Berk. Linn. Soc. Journ. vol. xvi. p. 44, 1878.

GOLUNGO ALTO.—On fallen branches, Alto Queta; March 1855. No. **431**.

4. **S. versicolor** Fr. Epicr. p. 547 (1836–38).

GOLUNGO ALTO.—On fallen branches in the primitive dense mountainous woods of Alto Queta; April 1856. No. **430**.

5. **S. spadiceum** Fr. *l.c.*, p. 549.

GOLUNGO ALTO.—On decayed wood in the forests of Mussengue; May 1855. No. **437**.

6. **S. lobatum** Fr. *l.c.*, p. 547.

HUILLA.—On rotten trunks in woods near lake Ivantâla; Feb. 1860. No. **428**.

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7. **S. perlatum** Berk. Enum. Fungi Cuming. no. 26 in Hook. Journ. p. 153, 1842.

CAZENGO.—On old trunks near the river in the elevated regions (*Regio Coffeana*) of the mountain of Muxaûlo ; Dec. 1854. No. **429**.

2. **HYMENOCHAETE** Lév. Ann. Sci. Nat. Ser. 3. vol. v. p. 150, 1846.

1. **H. rubiginosa** Lév., *l.c.*, p. 151.

GOLUNGO ALTO.—Somewhat rare, on hard decayed wood, *Gardenia Jovis-tonantis* (N-day), Alto Queta, Carengue ; July 1857. No. **440**. Somewhat rare on dead branches in the elevated regions of the mountains of Sobato de Bumba ; June 1856. No. **439**.

2. **H. fuliginosa** Lév. Ann. Sci. Nat. Ser. 3. vol. v. p. 152, 1846.

CAZENGO.—Somewhat rare, on the petioles of palm leaves (*Elæis guineensis*) near Trombeta ; Oct. 1854. No. **450**.

3. **H. olivacea** Cooke in Grev. vol. xiv. 1885, p. 11.

GOLUNGO ALTO.—On decayed trunks in woods near Trombeta ; Aug. 1857. No. **448**.

3. **PENIOPHORA** Cooke in Grev. viii. p. 20, 1880.

1. **P. papyrina** Cooke in Grev., *l.c.*, t. 124.

GOLUNGO ALTO.—On old trunks of fig-trees near Trombeta ; Sept. 1857. No. **435**. Effused on the larger rotten branches in the forests of Alto Queta ; Aug. and Sept. 1855. No. **446**.

HUILLA.—On rotten branches in forests consisting of Panda, near Ivantâla ; Feb. 1860. No. **433**.

2. **P. albo-marginata** Mass. Journ. Linn. Soc. vol. 25, p. 144, 1890.

GOLUNGO ALTO.—On decayed wood near the river Delamboa ; Jan. 1856. No. **445**.

VIII. CLAVARIEÆ.

1. **CLAVARIA** Vaill. Bot. Parisien. p. 39. pl. 7. f. 4, 1727.

1. **C. fastigiata** Linn. Flora Suec. no. 1269. p. 457, 1755.

HUILLA.—In grassy pastures among thickets surrounding the elevated woods up to 5600 ft. in the Monino highland ; not frequent ; April 1860. No. **421**.

2. **LACHNOCLADIUM** Lév. in Orb. Dict. viii. p. 487 (1846).

1. **L. furcellatum** Lév. Ann. Sci. Nat. Ser. 3. vol. v. 1846, p. 159.

GOLUNGO ALTO.—Very rare ; at the base of trunks or among leaves in moist woods of Central Queta ; May 1856. No. **424**.

IX. TREMELLINEÆ.

1. **HIRNEOLA** Fr. Syst. Orb. Veg. p. 93 (1825).

1. **H. polytricha** Sacc. Syll. Fung. vol. vi. p. 766 (1888).

GOLUNGO ALTO.—On fallen dry branches in the primitive woods of Mata de Quibanga ; specimens few ; June 1856. No. **453**. Also April 1856. No. **459**.

ZENZA DO GOLUNGO.—On dead branches (*Rubiaceæ*) in woods on the left bank of the river Chixe ; Sept. 1857. No. **460**.

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PUNGO ANDONGO.—On partially decayed dry branches in Mata de Pungo; May 1857. No. **457**. On slender rotten trunks, Mata de Pungo; Feb. 1857. No. **458**. On the bark of dead shrubs, Mata de Pungo; Dec. 1856. No. **456**.

X. USTILAGINEÆ.

1. **USTILAGO** Fr. Syst. Myc. iii. p. 517 (1829).

1. **U. Cesatii** Fisch. de Waldh. Aperçu Syst. des Ustil. 1877, p. 25.

HUILLA.—In the flowers of *Cymbopogon Humboldtii* Spr., Welw. herb. 7512, in damp meadows between Monino and lake Ivantâla; March 1860 (*ante*, p. 159).

PUNGO ANDONGO.—In the flowers of *Cymbopogon Humboldtii*, Jan. 1857, Herb. Welw. 2758. In the flowers of *C. filipendulus* Rendle, May 1857, Herb. Welw. 2773. In the flowers of *Heteropogon hirtus*, March 1857, Herb. Welw. 2806.

2. **UROCYSTIS** Rabenh. in Klotzsch Herb. Myc. ed. ii. no. 393.

1. **U. Colchici** Rabenh. Fung. Eur. no. 396 (1861).

AMBRIZ.—Frequent on the leaves of *Sansevieria angolensis* Welw. near Mubanga; Nov. 1853. No. **10**.

XI. UREDINEÆ.

1. **UROMYCES** Link in Berl. Mag. vii. p. 28, 1816.

1. **U. Albucæ** Kalch. & Cooke Grev. xi. p. 20, 1883.

U. Alliorum Welw. & Curr., *l.c.*, p. 295.

PUNGO ANDONGO.—On the leaves and stalks of *Albuca monophylla*; May 1857. No. **22**.

2. **U. purpureus** Lagerh. Ustil. Ured. Welw. in Bol. da Soc. Brot. 1889, p. 128.

PUNGO ANDONGO.—On the leaves of *Anthericum pterocaulon* (*ante*, p. 52) in damp meadows near Muta Lucala; March 1857. No. **19**.

3. **Puccinia** (vel **Uromyces ?**) **Dorsteniæ** Lagerh., *l.c.*, p. 131.

PUNGO ANDONGO.—On the leaves of *Dorstenia Psilurus* Welw. in the primitive woods of Mata de Pungo near the village; Feb. 1857. No. **184**.

2. **ÆCIDIUM** Pers. in Linn. Syst. Nat. vol. ii. p. 1472, 1791.

1. **Æ. Euphorbiæ** Pers. in Linn., *l.c.*, p. 1473.

HUILLA.—On leaves of *Euphorbia macra* in somewhat dry bushy and rocky pastures near Lopollo; March 1860. No. **128a**.

2. **Æ. cissigenum** Welw. Herb.

Æcidium sp. Welw. & Curr., Trans. Linn. Soc. vol. xxvi. 1870, p. 293.

PUNGO ANDONGO.—On the leaves of *Cissus* sp. near Caghuy; Nov. 1856. No. **105**.

3. **Æ. benguellense** Lagerh., *l.c.*, p. 134.

HUILLA.—On leaves of *Fadogia fuchsioides* Welw. in the woods near the great lake of Ivantâla; Jan. and Feb. 1860. No. **127**.

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4. **Æ. Welwitschii** Lagerh., *l.c.*, p. 134.

HUILLA.—On the leaves of *Royena pallens* Thunb. among the rocks of Morro de Monino ; rare, April 1860. No. **128.**

5. **Æ. Diospyri** A. L. Sm., Journ. Bot. vol. 36. p. 178, May 1898.

GOLUNGO ALTO.—On the leaves of *Diospyros mespiliformis* Hochst (Musolveira) near Trombeta ; March 1855. No. **206.**

3. **UREDO** Pers. in Usteri Ann. d. Bot. p. 16, 1795.

1. **U. africana** Lagerh., *l.c.*, p. 135.

HUILLA.—Frequent on the leaves of *Fadogia Cienkowskii* Schweinf. in the damp meadows between the river Ema and lake Ivantâla ; April 1860. No. **130.**

XII. SPHÆRIOIDEÆ.

1. **PHYLLOSTICTA** Pers. in Fr. Syst. Myc. ii. p. 527 (1823).

1. **P. Strychni** Allesch. in Engl. Pflanzenw. Ostafr. C. p. 35 (1895).

AMBRIZ.—On the leaves of an arborescent *Strychnos* ; Nov. 1853. No. **172.**

2. **P. Tricalysiæ** A. L. Sm., Journ. Bot. vol. 36, p. 178, May 1898.

PUNGO ANDONGO.—On the upper side of the perennial leaves of one of the shrubby *Rubiaceæ* (*Tricalysia griseiflora* K. Schum.) at the back of the Præsidium, Mata de Pungo ; Nov. 1856. No. **6.**

2. **PHOMA** Fr. Syst. Myc. ii. 546 (1823).

1. **P. confluens** Welw. & Curr., *l.c.*, p. 285.

GOLUNGO ALTO.—On the leaves of a climbing shrub (*Leguminosæ*) with white panicled flowers. Central Alto Queta ; Aug. 1856. No. **63.**

3. **ASCOCHYTA** Lib. Exs. p. minore parte em. Sacc. in Nuovo Giorno Bot. Ital. vii. p. 302, 1875.

1. **A. Tiliacoræ** A. L. Sm., *l.c.*

GOLUNGO ALTO.—On leaves of a climbing Menispermaceous plant, *Tiliacora chrysobotrya* Welw. (Abutua) in the woods of Alto Queta ; Dec. 1855. No. **4.**

2. **A. Spondiacearum** A. L. Sm., *l.c.*

GOLUNGO ALTO.—On leaves of *Spondias Mombin* L. at Mata de Quisuculo ; Feb. 1856. No. **173.**

4. **SEPTORIA** Fr. Syst. Myc. iii. p. 480 (1829).

1. **S. crustacea** Welw. & Curr., *l.c.*, p. 286.

GOLUNGO ALTO.—On the leaves of *Treculia africana* Decaisne, Welw. Herb. 2587. Trombeta ; Oct. 1856. No. **73.**

5. **CRYPTOSPORIUM** Kunze Myc. Heft. 1. p. 1. em. Corda in Sturm Fl. Kr. iii. Heft. 9. p. 105 (1829).

1. **C. circinans** Welw. & Curr., *l.c.*, p. 286.

LOANDA.—Frequent on the leaves of a spiny shrub, *Capparis corymbosa* Lam. var. *subglabra* Oliv., growing in thickets in cultivated fields, Loanda ; between the country house (Museque) of Sr. Schut and Penedo ; Jan. 1854. No. **64.**

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6. **PESTALOZZIA** De Not. Torino Mem. Acad. iii. p. 80, 1841.

1. **P. depazeoides** Welw. & Curr., *l.c.*, p. 284.

PUNGO ANDONGO.—Rare, on the leaves of *Ficus barbata* Warb. on the ridges of the rocks of the Præsidium (Pedra de Cazella); Dec. 1856. No. **17**.

XIII. PYRENOMYCETES.

1. **EUROTIUM** Link. in Linn. Spec. Plant. VI. i. p. 79.

1. **E. herbariorum** Link., *l.c.*

GOLUNGO ALTO.—On the leaves of a climbing shrub (*Apocynaceæ* ?) in the primitive woods near Sange; Feb. 1855. No. **152**.

2. **ASTERINA** Lév. Ann. Sci. Nat. Ser. 3. vol. iii. p. 59, 1845.

1. **A. difformis** Welw. & Curr., *l.c.*, p. 284.

PUNGO ANDONGO.—On the living leaves of *Triclisia Welwitschii* in the primitive wood "Mata do Pungo"; Dec. 1856. No. **39**.

3. **MELIOLA** Fr. Elench. Fung. ii. p. 109 (1828).

1. **M formosa** Welw. & Curr., *l.c.*, p. 284. t. 17. figs. 1, 2, 3.

GOLUNGO ALTO.—On the leaves of *Spondias Mombin* Linn. in the forest near Quibolo; Aug. 1856. No. **40**.

4. **BOMBARDIA** Fr. Summ. Veg. Scand. p. 389 (1846).

1. **B. fasciculata** Fr., *l.c.*

Sphæria Bombarda Batsch. Welw. & Curr., *l.c.*, p. 283.

GOLUNGO ALTO.—On rotten wood in the primitive forests of Quisucula near Bango; April 1856. No. **95**.

5. **XYLARIA** Hill Hist. Plants, pp. 62 and 63, 1751.

1. **X. variabilis** Welw. & Curr., *l.c.*, p. 280. t. 17. fig. 7.

GOLUNGO ALTO.—Sparse on fallen rotten trunks in the primitive woods of Quisucula near Bango; Feb. 1855. No. **104**.

2. **X. axillaris** Welw. & Curr., *l.c.*, p. 279. t. 17. fig. 24.

GOLUNGO ALTO.—In the axils of branches of trees of *Bosqueia angolensis* near the banks of the river Cuango; May 1855. No. **79**.

3. **X. arenicola** Welw. & Curr., *l.c.*, p. 280. t. 17. figs. 5 and 6.

PUNGO ANDONGO.—In moist sandy places between Pungo Andongo and Cazella, rare; Jan. 1857. No. **92**.

4. **X. aphrodisiaca** Welw. & Curr., *l.c.*, p. 280. t. 18. figs. 3 and 4.

GOLUNGO ALTO.—On rotten trunks in the dense primitive woods not far from the river Delamboa; Jan. 1856. No. **102**.

5. **X. Hypoxylon** Grev. Flora Edin. p. 355 (1824).

GOLUNGO ALTO.—On rotting branches half immersed in the soil in shady woods on the right bank of the river Delamboa; Dec. 1855. No. **91**. Specimen imperfect and rather doubtful. On old rotten trunks in the primitive woods near Sange and near Caverna de Salitre (saltpetre), Sobado de Mussengue; May 1855. No. **87**.

CAZENGO.—Densely cæspitose on dead trunks in the primitive woods of the mountains of Muxaûla; June 1855. No. **88**.

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AMBACA.—On old trunks in the elevated woods near Puri-Cacarambola; Oct. 1856. No. **90**.

BUMBO.—In dense array in very damp, dense, primitive woods near Bumbo; Oct. 1859. No. **135**.

6. **X. digitata** Grev. Flor. Edin. p. 355 (1824).

BUMBO.—On large rotting trunks in the dense damp woods of Serra de Xella, about 3000 ft. high; Oct. 1859. Nos. **136** and **136***b*, the latter on *Nauclea*.

7. **X. scopiformis** Mont. Ann. Sci. Nat. Ser. 2. vol. xiii. 1840, p. 349.

GOLUNGO ALTO.—On old rotten trunks in the woods of Quilombo-Quiacatubia, in one place only, but frequent there; Feb. 1855. No. **89**. This species has been recorded by Currey, *l.c.*, p. 283, as *Hypoxylon scopiforme* Mont.

8. **X. hippotrichoides** Sacc. Syll. Fung. vol. i. p. 344 (1882).

GOLUNGO ALTO.—On branches near Cabanga rather rare, also on standing branchlets of *Asparagus*, etc., in Alto Queta and near Sange; Feb. 1855. No. **5**.

6. **PORONIA** Willd. Flor. Berol. Prodr. p. 400, 1787.

1. **P. claviformis** Welw. and Curr, *l.c.*, p. 281.

PUNGO ANDONGO.—On rotten wood in caves of the rocks, Arimo do Salgado, rare; Dec. 1856. No. **85**. Spores unknown. A second specimen evidently the same but also without ascospores, on tufts of burnt grass near Cazella; Jan. 1857. No. **462**.

7. **HYPOXYLON** Bull. Champ. de Fr. I. p. 168, 1791.

1. **H. annulatum** Mont. Ann. Sci. Nat. 1855, Ser 4. vol. iii. p. 117.
Var. **depressum** Welw. & Curr., *l.c.*, p. 283.

AMBACA.—On old rotten trunks of trees near Cabinda; Oct. 1856. No. **69**. On rotten trunks in the elevated woods near Puri-Cacarambola; Oct. 1856. No. **83**. On old rotten trunks in woods near the great cavern of Puri-Cacarambola; Oct. 1856. No. **84**. This specimen is imperfect and somewhat doubtful.

2. **H. rubiginosum** Fr. Summ. Veg. Scand. p. 384 (1846).

GOLUNGO ALTO.—On dead fallen branches in the woods of Serra de Alto Queta; March 1855. Nos. **82** and **82***b*.

3. **H. serpens** Fr. *l.c.*

GOLUNGO ALTO.—Frequent on the bark of decayed branches of various trees near Bança de Mussengue; July 1855. No. **81**.

8. **KRETZSCHMARIA** Fr. Sum. Veg. Scand. p. 409 (1846).

1. **K. aggregata** Sacc. Syll. Fung. Add. ad vol. i. p. xxix. (1883).
Hypoxylon aggregatum Welw. & Curr., *l.c.*, p. 282. tab. 17. fig. 22.

GOLUNGO ALTO.—On rotten trunks near Terras de Bumba covering almost the whole trunk of a large tree; May 1855. No. **94**. On examining the plant I find a number of scattered spores in the perithecia; they are dark-brown, curved, tapering toward the ends and measure 25 to 27 μ by 10 μ. A second specimen collected in Angola is without date, locality or number.

2. **K. angolensis** Sacc., *l.c.*
Hypoxylon angolense Welw. & Curr., *l.c.*, p. 282. tab. 17. fig. 19.

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GOLUNGO ALTO.—On rotten trunks of *Bombax buonopozense* P. Beauv. (*Mafumeira branca*) near Quibolo ; March 1856. Nos. **103** and **524**.

3. **K. cetrarioides** Sacc., *l.c.*

Hypoxylon cetrarioides Welw. & Curr., *l.c.*, p. 282. tab. 18. fig. 5.

GOLUNGO ALTO.—On the bark of rotten trees in the primitive woods near Quibolo ; April 1856. No. **80**. In the woods of Queta. No. **523**.

PUNGO ANDONGO.—On rotten trunks of large trees in the primitive woods near Quilanga ; April 1857. No. **97**. The spores measure 30 by 10 μ.

9. **DALDINIA** Ces. & de Not. Comm. Critt. Ital. I. 197 (1863).

1. **D. concentrica** Ces. & de Not., *l.c.*, p. 198.

Hypoxylon ustulatum Bull. Welw. & Curr., *l.c.*, p. 282.

GOLUNGO ALTO.—On dead trunks of trees (*Spondias*) near Ponte do Felix Simoes ; Nov. 1854. Nos. **101** and **522**. On trunks of *Sterculiaceæ* in the woods of Muria ; Sept. 1857. No. **525**.

PUNGO ANDONGO.—In the primitive woods near Quilanga ; Jan. 1857. No. **99**. A very doubtful specimen.

10. **NUMMULARIA** Tul. Sel. Fung. Carp. ii. p. 42 (1863).

1. **N. Bulliardi** Tul., *l.c.*, p. 43.

Hypoxylon nummularium Bull. Welw. & Curr. *l.c.*, p. 282.

GOLUNGO ALTO.—On dead standing branches in the woods of Serra de Alto Queta ; Dec. 1855. No. **93**. Frequent in all secondary woods, Capopa. On trunks of *Argyrodendron* (Croton) ; June 1856. No. **98**.

2. **N. suborbicularis** Sacc. Syll. Fung. vol. i. p. 399 (1882).

Hypoxylon suborbiculare, Welw. & Curr. *l.c.*, p. 281. tab. 17. fig. 18.

HUILLA.—In the woods between Monino and lake Ivantâla on half dead trunks ; March 1860. No. **137**.

11. **PHYSALOSPORA** Niessl. Verhandl. d. Nat. Ver. in Brünn., vol. xiv. p. 170, 1875.

1. **P. Labocula** Sacc. Syll. Fung. I. p. 447 (1882).

The above species differs slightly from that described by Leveillé, in having the spores arranged in the ascus in two oblique rows. The ascus is somewhat ovate-oblong, 70 by 15 μ. ; the spores measure 12 to 15 by 5 μ.

CAZENGO.—On the leaves of *Acacia Sieberiana* DC. near Cacula ; June 1855. No. **228**.

12. **TRICHOSPHÆRIA** Fckl. Symb. Myc. p. 144 (1869).

1. **T. acanthostroma** Sacc. Syll. Fung. I. p. 454 (1882).

GOLUNGO ALTO.—On old trunks of a species of *Vitex* near Camilungo ; June 1855. No. **42**. On decayed trunks in the woods of Queta Oriental. ; June 1856. No. **444**. On rotten trunks near Trombeta ; Aug. 1857. No. **452**. A very imperfect specimen.

AMBACA.—Frequent on the bark of old trees near Cabinda, especially on *Spondias* ; Oct. 1856. No. **46**. There is a very small specimen without date or locality. No. **46***b*.

13. **PHYLLACHORA** Nits. in Fckl. Symb. Myc. p. 216 (1869).

1. **P. repens** Sacc. Syll. Fung. vol. ii. p. 597 (1883).

Sphæria lanaris Welw. & Curr., *l.c.*, p. 283.

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GOLUNGO ALTO.—On leaves of various species of *Ficus* near Canguerasange; Nov. 1854. No. **74**. Also near Sange, July 1856. Frequent on old leaves of *Ficus* (cf. Herb. Welw. 6387 and 6411) Quibige; Dec. 1855. No. **76**. On the living leaves of *Ficus* rather rare, Sange; May 1855. No. **75**.

HUILLA.—*Isothea rhytismoides* Fr. Welw. & Curr. *l.c.*, p. 285. On leaves of *Ficus trachyphyllus* Fenzl. in woods at Monino; May 1860. No. **141**. Also near Lopollo, Feb. 1860. Herb. Welw. 6374. See Journ. Bot.

2. **P. irregularis** A. L. Sm. Journ. Bot. vol. xxxvi. p. 179, May 1898.

Isothea irregularis Welw. & Curr., *l.c.*, p. 285.

GOLUNGO ALTO.—On the leaves of a species of *Ficus* (cf. Herb. Welw. 6335), Alto Queta; March 1856. No. **2**.

3. **P. minutissima** A. L. Sm., *l.c.*

Isothea minutissima Welw. & Curr. *l.c.* p. 285.

GOLUNGO ALTO.—On the leaves of a species of *Pennisetum* (Marianga) near Cangunho (Rio Cate); Sept. 1855. No. **31**.

13. **DOTHIDELLA** Speg. Anales de la Soc. Cien. Argent., vol. 12. p. 185, 1881.

1. **D. Welwitschii** A. L. Sm., *l.c.*

MOSSAMEDES.—On the leaves of *Tumboa Bainesii* Hook. f., near Cabo Negro; Sept. 1859. No. **206**.

2. **D. Graphis** A. L. Sm., *l.c.*

LOANDA.—On the branches of a shrub without leaves or flowers near Maianga do Povo; March 1854. No. **507**.

14. **MICROTHYRIUM** Desm. Ann. Sci. Nat. Ser. 2. vol. xv. p. 137, 1841.

1. **M. Millettiæ** A. L. Sm., *l.c.*

GOLUNGO ALTO.—On leaves of *Millettia Griffoniana* Baill., on the Serra de Alto Queta towards the river Luinha; July 1856. No. **223**.

15. **SEYNESIA** Sacc. Syll. Fung. vol. ii. p. 668 (1883).

1. **S. nobilis** Sacc., *l.c.*

Pemphidium nobile Welw. & Curr., *l.c.*, p. 283. tab. 17 f. 12.

GOLUNGO ALTO.—On the petioles of the leaves of a palm, *Elæis guineensis*, near the river of Capopa; June 1856. No. **60**.

XIV. HYPHOMYCETES.

1. **HAPLOTRICHUM** Link in Linn. Spec. Pl. vi. i. p. 52 (1824).

1. **H. capitatum** Link, *l.c.*

PUNGO ANDONGO.—Rare, on the leaves of a species of *Gymnosporia* Sobato Cabanga; Jan. 1857. No. **48**.

There is no *Haplotrichum* left on this specimen, the leaf is covered with a gall-like formation.

2. **PENICILLIUM** Link in Berl. Ges. Nat. Freunde Mag. iii. p. 16, 1809.

1. **P. glaucum** Link, *l.c.*, p. 17.

LOANDA.—Frequent, forming a grey pellicle on the surface of ink in the rainy season; Nov. 1857. No. **38**.

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3. **HELMINTHOSPORIUM** Pers. Myc. Eur. i. p. 17, 1822.

1. **H. Cordiæ** Welw. & Curr., *l.c.*, p. 292. t. 17. figs. 9 to 11.

GOLUNGO ALTO.—On the leaves of *Cordia chrysocarpa* Bak. in the primitive woods near Sange; March 1856. No. **1**.

4. **STILBUM** Tode Fung. Meckl. i. p. 10, 1790.

1. **S. sericeum** Welw. & Curr., *l.c.*, p. 291.

GOLUNGO ALTO.—Rare, on the bark of a leguminous tree, *Albizzia fastigiata* Oliv. in the forests of Alto Queta; Jan. 1856. No. **49**.

2. **S. cæspitosum** Welw. & Curr., *l.c.*

GOLUNGO ALTO.—On old trunks of *Ficus* during the rainy season near Canguerasange; Nov. 1854. No. **50**. On decayed trunks of *Ficus* in moist woods, Sobato de Quibombo Quiacatubia, etc.; Feb. and May 1855. No. **50***b*.

HUILLA.—On the bark of *Ficus*, very frequent during the rainy season near Lopollo towards Monino; Feb. 1860. No. **131**.

5. **GRAPHIUM** Corda Ic. Fung. I. p. 18 (1837).

1. **G. aterrimum** Sacc. Syll. Fung. vol. iv. p. 611 (1886).

Stilbum aterrimum Welw. & Curr., *l.c.*, p. 291.

GOLUNGO ALTO.—On the cortex of decayed trees of the genus *Ficus*, in the woods of Quibanga; April 1855. No. **52**.

6. **TUBERCULARIA** Tode Fung. Meckl. 1. p. 18 (1790).

1. **T. guarantica** Speg. Fung. Guar. i. Anal. Soc. Cien. Arg. 1884. p. 126.

GOLUNGO ALTO.—On the bark of rotten trunks of *Ficus*, Sange; April 1855. No. **175**.

7. **HYMENULA** Fr. Syst. Myc. ii. p. 233 (1823).

1. **H. vulgaris** Fr., *l.c.*, p. 234.

PUNGO ANDONGO.—On the follicles of *Strophanthus* near the bridge at Luxillo; Jan. 1857. No. **20**.

8. **EXOSPORIUM** Link in Berl. Ges. Nat. Freunde Mag. iii. p. 9, 1809.

1. **E. celatum** A. L. Sm. Journ. Bot. vol. xxxvi. p. 179. May 1898.

Sporidesmium celatum Welw. & Curr., *l.c.*, p. 292. tab. 17. fig. 15.

GOLUNGO ALTO.—On the leaves of *Croton Draconopsis* in the thicket behind Rodrigo's Cubata; Oct. 1855. No. **77**.

XV. SCLEROTIACEÆ.

1. **SCLEROTIUM** Tode Fung. Meckl. 1. p. 2 (1790).

1. **S. stipitatum** Berk. & Curr. in Trans. Linn. Soc. vol. xxiii. pp. 91, 93.

HUILLA.—On the roots of dead trees concealed under 1 to 3 ft. of soil in cultivated potato fields near Lopollo; April and May 1861. No. **138**.

2. **S. flavidum** Welw. & Curr., *l.c.*, p. 292.

PRINCE'S ISLAND.—On the ground among decaying turf on sparingly grassy slopes 800 to 1000 ft. high in a moist place at the opening of the primitive forest; Sept. 1853. No. **27**.

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MYCETOZOA.

DETERMINED BY ARTHUR LISTER, F.R.S.

1. **STEMONITIS** Gleditsch Meth. Fung. p. 140. tab. iv., 1753.

1. **S. splendens** Rost. Mon. p. 195.

GOLUNGO ALTO.—On dead stems and on living leaves of *Musa sapientum* near the river Luinha; gathered during an excursion with the distinguished Sr. Pereira, Jan. 1855. No. **109**.

2. **S. herbatica** Peck in Rep. N. York Mus. xxvi. p. 75, 1874.

GOLUNGO ALTO.—On living leaves of a species of *Jussiæa* near the river Quiapoze; Dec. 1855. No. **112**.

2. **COMATRICHA** Preuss in Linnæa xxiv. p. 140, 1851.

1. **C. longa** Peck in Rep. N. York Mus. xliii. p. 24, 1890.

GOLUNGO ALTO.—On rotten wood in the primitive woods of Quisucula near Bango. Aug. 1857. No. **110**. On fallen bark in the damp woods of Serra de Alto Queta; Dec. 1855. No. **111**.

3. **ARCYRIA** Hill Nat. Hist. ii. p. 47, 1751.

1. **A. incarnata** Pers. Obs. Myc. I. p. 58 (1815).

GOLUNGO ALTO.—On the bark of trunks in the woods of Alto Queta; rare; July 1855. No. **122**.

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ERRATA.

VOL. I.

Page xiii, line 30, *for* 3000 or 4000 *read* 300 or 400.
„ xvii, last line but one, *for* 1871 *read* 1873.
„ xix, line 27, for *Consilho* read *Conselho*.
„ xx, „ 19, *for* de *read* do.
„ xxv, „ 12 from bottom, *for* Ortopteros *read* Orthopteros.
„ 3, lines 32 and 34, *for* Agnas *read* Aguas.
„ 7, line 6, *for* form on *read* forming.
„ 12, „ 16, *after* **grandiflora** *insert* Oliv.
„ 13, „ 14 from bottom, *for* Songa *read* Songo.
„ 15, „ 11 from bottom, *for* "Xib" *read* "Xile."
„ 22, „ 10, *for* **NYMPHÆA** Tournf. L. *read* **CASTALIA** Salisb. in Konig & Sims. Ann. Bot. ii. p. 71 (1805).—*Nymphæa* L. pro parte.
„ „ „ 11, *for* **N. Lotus** *read* **C. mystica** Salisb., *l.c.*, p. 73.—*Nymphæa Lotus*.
„ „ „ 4 from bottom, *for* **N. malabarica** *read* **C. stellaris** Salisb., *l.c.*, p. 72.—*Nymphæa malabarica*.
„ 24, „ 11, *for* **NASTURTIUM** *read* **RORIPPA** Gesner ex Scop. Fl. Carniol. edit. 1, p. 520 (1760).—*Nasturtium*.
„ „ „ 12, *for* **N. officinale** *read* **R. Nasturtium** Beck Fl. Nied. Oesterr. ii. 463 (1892) (*Roripa*).—*Nasturtium officinale*.
„ „ „ 24, *for* **N. indicum** *read* **R. indica**.—*Nasturtium indicum*.
„ „ „ 12 from bottom, *for* **N. humifusum** *read* **R. humifusa**.—*Nasturtium humifusum*.
„ 28, lines 10–8 from bottom, should read as follows:—
2. **PEDICELLARIA** Schrank in Roem. & Usteri Mag. Bot. iii. pt. vii. p. 10 (1790).
Gynandropsis DC. Prodr. i. p. 237 (1824); Benth. & Hook. f. Gen. Pl. i. p. 106.
1. **P. pentaphylla** Schrank, *l.c.*, p. 11.
Gynandropsis pentaphylla DC., *l.c.*, p. 238; Oliv. Fl. Trop. Afr. i. p. 82.
„ **36**, line 10 from bottom, *for* Cuanza *read* Cuango.
„ 37, „ 2 from bottom, *for* Cuanza *read* Cuango.
„ 39, „ 17, *for* "Fele" *read* "Xichi ofele."
„ 40, „ 1, *for* 28 *read* 128.
„ **43**, „ 19 from bottom, *for* 3000 *read* 5000.
„ 67, lines 6-2 from bottom should read as follows:—
6. **LASS** Adans. Fam. Pl. ii. p. 400 (1763).
Malache B. C. Vogel in Trew. Pl. Sel. Ehret. dec. viii. p. 50. t. 90 (1772). *Pavonia* Cav. Diss. iii. p. 132. tt. 45-47, 49 (1786); Benth. & Hook. f. Gen. Pl. i. p. 205.
1. **L. macrophyllum** O. Kuntze, Rev. Gen. Pl. III. ii. p. 20 (1898) (*Lassa macrophylla*).
Pavonia macrophylla E. Mey. ex Harv. in Harv. & Sond. Fl. Cap. i. p. 169 (1860); Mast. in Oliv. Fl. Trop. Afr. i. p. 190 (1868). *Malache macrophylla* O. Kuntze, *l.c.*, i. p. 70 (1891).

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Page 68, lines 6 and 7 should read as follows:—

2. **L. hirsutum.**

Pavonia hirsuta Guill. & Perr. Fl. Senegamb. i. p. 51 (1830); Mast. in Oliv. Fl. Trop. Afr. i. p. 191. *Malache hirsuta* O. Kuntze, Rev. Gen. Pl. i. p. 70 (1891).

„ 68, lines 12 and 13 should read as follows:—

3. **L. Schimperianum.**

Pavonia Schimperiana Hochst. in Pl. Schimp. Abyss. ii. n. 1405 (1842); A. Rich. Fl. Abyss. i. p. 52 (1847); Mast. in Oliv. Fl. Trop. Afr. i. p. 192. *Malache Schimperiana* O. Kuntze, Rev. Gen. Pl. i. p. 72 (1891).

„ 75, line 8, *for* Congo *read* Cuango.
„ 83, „ 19, *after* 1857 *insert* No. **4693.**
„ 84, „ 18, *for* Cacabango *read* Cacalungo.
„ 84, „ 22, *for* Quilembo *read* Quilombo.
„ 85, „ 14 from bottom, *for* following *read* flowering.
„ 120, „ 16 from bottom, *for* Cuanza *read* Cuango.
„ 139, „ 13, *for* **D. retroversum** Hiern, sp. n. *read* **D. parvifolium** Engl. Bot. Jahrb. xxiii. p. 136 (15 Sept. 1896).
„ 164, „ 7 from bottom, *for* **1459** *read* **1495.**
„ 173, „ 14 from bottom, *for* peduncle *read* petiole.
„ 182, „ 4 from bottom, *for* Cazengue *read* Carengue.
„ 187, „ 13 from bottom, *for* (1891) *read* (1892).
„ 213, „ 23, *for* dam *read* Lam.
„ 214, „ 6 from bottom, *for* Lapostas *read* Lagostas.
„ 215, „ 2 from bottom, *for* in. *read* ft.
„ 229, „ 14, *for* Quisucolo *read* Quisuculo.
„ 248, „ 27, *for* 36 *read* 86.
„ 250, „ 23, *for* Canguerange *read* Canguerasange.
„ 262, „ 28, *for* Perevia *read* Pereira.
„ 267, „ 21, *after* **minimus** *insert* Medik, *l.c.*
„ 288, „ 19 from bottom, *for* Cadumba *read* Candumba.
„ 291, „ 14 from bottom, *for* Banga *read* Banza.
„ 296, „ 7, *for* Candamba *read* Candumba.
„ 298, „ 14, *for* 529 *read* 529*b*.
„ 299, „ 21 from bottom, *for* Zenzas *read* Zengas.
„ 332, lines 12–15 should read as follows:—

1. **LAUREMBERGIA** Berg. Pl. Cap. pp. 350, 351 (Aug. 1767).

Serpicula L. Mant. Pl. p. 16 (Oct. 1767); Benth. & Hook. f. Gen. Pl. i. p. 675.

1. **L. repens** Berg., *l.c.*

Serpicula repens L., *l.c.*, p. 124; Oliv. Fl. Trop. Afr. i. p. 405. *S. serpyllifolia* Burm. f. Prodr. Fl. Cap. p. 26 (1768).

Var. **brachypoda** (Welw. ms.).

„ 366, line 2, *for Heteropteris read Heterotis.*
„ 396, „ 24, *for* three *read* four.
„ 465, „ 9 from bottom, *for* 3 *read* 4.
„ 498, „ 24, *for* **unifiora** *read* **unifiora.**
„ 550, „ 15, and page 552, line 6 from bottom, *for* (1896) *read* (1897).
„ 556, „ 13 from bottom, *for Blume read Blumea.*
„ 562, „ 26, p. 566, line 7 from bottom, and p. 569, line 5, *for* (1896) *read* (1897).
„ 575, lines 6–12 should read as follows:—

42. **EUPATORIOPHALACRON** Adans. Fam. Pl. ii. p. 130 (1763).

Eclipta L. Mant. Pl. alt. p. 157. n. 1321 (1771); Benth. & Hook. f. Gen. Pl. ii. p. 361.

1. **E. album.**

Verbesina alba L. Sp. Pl. edit. 1, p. 902 (1753). V.

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prostrata L., *l.c. Cotula alba* and *C. prostrata* L. Syst. Nat. ii. p, 564 (1767). *Eclipta erecta, Ecl. prostrata,* and *Ecl. punctata* L. Mant. Pl. alt. p. 286 (1771). *Ecl. alba* Hassk. Pl. Jav. Rar. p. 528 (1848); O. & H. in Oliv. Fl. Trop. Afr. iii. p. 373. *Ecliptica alba* O. Kuntze, Rev Gen. Pl. i. p. 334 (1891).

Page 575, line 15 from bottom, *for* (1896) *read* (1897).

„ 576, lines 20–24, should read as follows:—

45. **NIEBUHRIA** Neck. Elem. Bot. i. p. 30 (1790) non Scop.

Wedelia Jacq. Enum. Pl. Carib. p. 8 (1760); Benth. & Hook. f. Gen. Pl. ii. p. 370; non Loefl. (1758).

1. **N. africana.**

Wedelia africana Pers. Syn. Pl. ii. p. 490 (1807); P. Beauv. Fl. Ow. ii. p. 19. t. 69 (1810); O. & H. in Oliv. Fl. Trop. Afr. iii. p. 376. *Seruneum africanum* O. Kuntze, Rev. Gen. Pl. i. p. 365 (1891).

„ 576, line 9 from bottom, and

„ 577, „ 22, *for* **W. huillensis** *read* **N. huillensis**, *and for* **W. albiflora** *read* **N. albiflora.**

„ 578, „ 4, and

„ 603, „ 24, *for* (1896) *read* (1897).

„ 696, „ 21, *for* p. 693 *read* p. 309. n. 693.

„ 717, „ 16, for *C. procumbens* L. read **C. procumbens** L.

„ „ last line, for *Arthocnemum* read *Arthrocnemum.*

„ 764, line 31, *for* 11 *read* 12, and alter following numbers to correspond.

„ 810, „ 23, for *Loranthus Buchneri* Engl. read *L. sessilifolius* P. Beauv.

„ 824, lines 11–23, *for* **E. amplexicaule** S. Moore, (et seq.) *substitute* **E. Clarkei** Hiern, sp. n. (et seq., vide p. 1032).

„ 837, line 16, *for* **Vitex huillensis** Hiern, sp. n., *read* **V. grisea** Baker in Fl. Trop. Afr. v. 335 (1900).

„ 873, „ 15, *for* **5830** *read* **5530.**

„ 882, lines 21 and 22, *dele from* In hot . . . *to* No. **5389** *incl.*

„ 1004, „ 31-33, *dele from* At the . . . *to* No. **6393** *incl.*

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Page 9, line 1, *for* **guyomanum** *read* **Guyonianum.**

„ 9, „ 3, *for* **guyomanus** *read* **Guyonianus.**

„ 11, „ 18, *after* No. **665** *insert* PUNGO ANDONGO.—, *and begin a fresh line.*

„ 23, „ 37, *after* No. **6441** *insert* GOLUNGO ALTO.—, *and begin a fresh line.*

„ 24, lines 12-14. The district of No. **6448***b* should be PUNGO ANDONGO.

„ 34, line 22, *after* HÆMANTHUS *insert* Linn.;

„ 38, „ 7 from bottom, *before* 1012 *insert* COLL. CARP.

„ 39, „ 21 and 32, *after* No. **4036** *insert* partly.

„ 46, between lines 14 and 15 *add A. arborescens* Welw. in Bolet. Conselh. Ultram. May 1856, p. 251; non Miller.

„ 53, line 6, *after* No. **3776** *insert* partly.

„ 55, „ 29, *add at end* No. **3793.**

„ 59, „ 8, *for* No. **1049** *read* COLL. CARP. 1049.

„ 66, lines 34-41. *Cancel these lines, and add after* No. **1626**, *on last line of p.* 64, COLL. CARP. 1050.

„ 66, bottom of page. No. 3014 is probably a *Nymphæa.*

„ 79, line 8 from bottom, *for* GOLUNGO ALTO *read* HUILLA.

„ 81, „ 17, *add at end* No. **6655.**

„ 85, „ 6 from bottom, *after* No. **214** *add* COLL. CARP. 1022.

„ 88, „ 5 from bottom, *for* 1852 *read* 1857.

„ 89, last line, *for* Sept. *read* Dec.

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Page 92, line 8 from bottom *add W. Delilei* Welw. ex Trim., *l.c.*, non. Schleid.
„ 93, „ 13, *after* No. **3010** *add* COLL. CARP. 1023.
„ 99, „ 4 from bottom, *for* stellarioides *read stellarioides.*
„ 105, „ 11 from bottom, *dele* in.
„ 106, „ 7 from bottom, *dele the whole line.*
„ 110, „ 3 from bottom, *before* On spongy *insert* HUILLA.—
„ 122, last line, *prefix* CAPE DE VERDE ISLANDS.—
„ 132, „ 33, *for E. abyssinica read* **E. abyssinica.**
„ 155, „ 7, *for* No. **1321** *read* n. 1321.
„ 155, „ 31, *for* Cuanga *read* Cuango.
„ 181, lines 1 and 2, *transfer so as to follow line* 5.
„ 187, line 36, *add at end* No. **2930.**
„ 193, „ 4 from bottom, *for* heavy *read* hoary.
„ 195, „ 18, *dele* No. **7243.**
„ 195, „ 19, No. **7241** should be **7243.**
„ 196, „ 6, *for* **7653** *read* **2653.**
„ 206, „ 14, *for* **monspeliense** *read* **monspeliensis.**
„ 222, „ 11 from bottom, *for* **2902** *read* **2602.**
„ 229, „ 15, *for* **abyssinicum** *read* **abyssinicus.**
„ 229, „ 41, *for* **pusillum** *read* **pusillus.**
„ 230, „ 19, *for* **benguellense** *read* **benguellensis.**
„ 237, „ 15, *for* HUILLA *read* PUNGO ANDONGO.
„ 240, „ 2 from bottom, *for* 1894 *read* 1854.

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E. RAY LANKESTER,
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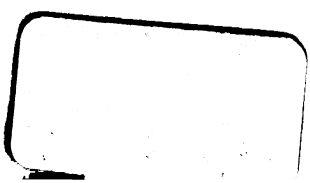

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